Oral Health in Missouri 2014

A Burden Report by the Missouri Department of Health and Senior Services

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http://health.mo.gov/living/families/oralhealth/oralhealthsurv.php

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Executive Summary

Oral Health in Missouri – 2014 is the first comprehensive report containing all available oral health data produced by the Missouri Oral Health Program (MOHP). The purpose of this report is to describe oral health trends and disparities in Missouri and to disseminate those findings to citizens, stakeholders, partners, and decision makers. The format of this report is based on the model of an oral health "burden report" as defined by the Centers for Disease Control and Prevention and the Association of State and Territorial Dental Directors, and includes context, national comparisons, and trends over time for each finding.

Oral Health in Missouri – 2014 will be used internally by the MOHP to develop Missouri's new state plan, to improve oral health surveillance, and to guide interventions. This report is also available for organizations, communities, and decision makers to guide their programs and initiatives.

Key Findings

- Currently, 76.4% of Missourians served by community water systems receive optimally fluoridated water, which is better than the percentage for the nation as a whole.
- Missouri adults with higher educational attainment and higher annual income are twice as likely to visit the dentist as individuals from the lowest socioeconomic group.
- Missouri adults older than 65 years of age from the lowest socioeconomic group were three times more likely to have lost all of their permanent teeth due to tooth decay or gum disease than individuals from higher socioeconomic groups.
- About 41% of Missouri adults who smoke and visited a dentist were advised to quit by their dentist; about 55% of chewing tobacco users who visited a dentist were advised to quit.
- Among Missouri residents, only 42.3% of women visited a dentist and 37% had their teeth cleaned during their most recent pregnancy.
- There are approximately 60,000 emergency department (ED) visits due to non-traumatic dental complaints among Missouri residents annually; based on national estimates, these visits cost approximately $17.5 million per year.
- Inpatient hospitalizations due to non-traumatic dental complaints are associated with about $13.5 million in hospital charges annually.

Recommendations

- Oral health initiatives should focus on preventive measures such as fluoride varnish, dental sealants, and community water fluoridation.
- All Missourians should receive more education about the need for regular dental visits and the importance of oral health for their overall health, but this is especially important for those of lower socioeconomic groups and individuals with chronic disease.

- Dentists, dental hygienists, and medical providers should be leveraged to educate patients about key issues, such as oral cancer and dental care during pregnancy.
- Improvements to the distribution and availability of oral health professionals, especially those that serve low income individuals, are recommended in order to decrease tooth loss in adults and reduce the use of hospitals for non-traumatic dental complaints.

Introduction

The Surgeon General's report Oral Health in America states that oral health is essential to general health and well-being. The consequences of poor oral health range from difficulty eating, speaking, and learning in children to missed work, adverse diabetes and pregnancy outcomes, and risk of heart disease and stroke in adults. The report also states that good oral health is achievable by all, but not everyone is achieving the same degree of oral health. The most vulnerable individuals are more affected by poor oral health, including poor children, the elderly, and members of racial and ethnic minorities.[1]

The Missouri Oral Health Program (MOHP) has been conducting oral health surveillance for many years. The MOHP collects and reports data on fluoridation of community water systems, conducts the Basic Screening Survey (BSS) on school-aged children every five years, and coordinates the collection of oral screening data on each child that participates in the Preventive Services Program (PSP), an oral health education and prevention program. The MOHP is housed within the Office of Primary Care and Rural Health, which collects and analyzes oral health workforce statistics. Additionally, the MOPH receives data from other programs within the Department of Health and Senior Services (DHSS) that coordinate the collection of multiple rich data sources that are directly and indirectly related to oral health.

Ultimately, the purpose of Oral Health in Missouri – 2014 is to compile and contextualize all available oral health data, identify gaps where additional data need to be gathered, disseminate findings to the public and stakeholders, and use the information to guide interventions and policies within DHSS.

Methodology

Oral Health in Missouri – 2014 is based on the format of a "burden report" using guidance from the Association of State and Territorial Dental Directors (ASTDD) and the Centers for Disease Control and Prevention (CDC). Whenever possible, state-specific findings are compared to national data to depict what the status of oral health is for Missourians. Some national data are based on a median for all states and territories or all states that participate in a particular type of surveillance activity while other data have national percentages or rates that are directly comparable to Missouri findings. Trend data are also displayed when available to determine if findings are changing over time. Comparisons to relevant Healthy People 2020 oral health objectives are included whenever possible. Disparities by age, sex, race, ethnicity, and socioeconomics are also reported when available.

The CDC's Water Fluoridation Reporting System (WFRS) collects data on community water fluoridation (CWF) for all states. The system allows for comparisons between Missouri's current status and that national percentage of individuals on community water systems that receive optimally fluoridated water. The Missouri Department of Natural Resources provides the MOHP with CWF data from its State Drinking Water Information System, which the MOHP enters into the WFRS system on a quarterly basis.

The BSS that is used to conduct a standardized oral health screening on children in selected populations was implemented in Missouri in 2005 and 2010. The decision was made to report 2005 findings rather than the more recent 2010 BSS due to inconsistencies in random sampling methods.

Compliance with random sampling methodology allows for results to be generalized to the population as a whole within Missouri and allows for valid comparisons with findings from other states and nationally. The 2005 BSS was conducted on both third and sixth grade students, however, only the results for the third grade students have been adjusted.[2] Please visit http://health.mo.gov/living/families/oralhealth/pdf/OralHealthReport.pdf for more information on the 2005 report. The distinction between adjusted and unadjusted findings is clearly noted on each figure for third and sixth grade students. For national comparisons, a median was calculated from statistics on third grade students provided by 43 states (including Missouri) in the National Oral Health Surveillance System (NOHSS) for a variety of time frames dating back to 1998. It is important to note that a new BSS is planned for the 2014-2015 school year, to be carried out according to ASTDD-approved guidelines.

PSP results for the 2012-2013 school year are compared alongside the 2005 BSS results to provide additional context. PSP screenings follow the BSS template; however, the PSP is a voluntary program rather than a subset of randomly selected schools. Although PSP data are not from a random sample, the population is large: out of roughly 72,000 children screened, 9,863 (14%) were third graders and 3,525 (5%) were sixth graders. Additionally, the PSP includes participants in nearly every Missouri county.[3] Additional PSP findings for all grade levels including analysis by race, ethnicity, sex, and age group are also included. For more information on the PSP, the demographics of its participants, and additional screening results from the 2012-2013 school year, please visit http://health.mo.gov/blogs/wp-content/uploads/2013/05/OralHealthReport2012-2013.pdf.

The Behavioral Risk Factor Surveillance System (BRFSS) is an important source of information on oral health status and related risk factors. Randomly selected adults (18 years of age and older) are asked to participate in a telephone interview; due to this random selection, the results are generalizable to the population as a whole.[4] All available oral health trend data are reported, however, the 2012 results are not reported on the same trend line as previous years due to a major change in sampling methodology. National data for several years are provided by CDC for comparison to state-specific findings.[5] The median for all 50 states, District of Columbia, and two territories (n=53) was selected for this national comparison. Missouri also conducted a special County-Level Study using methods and techniques compatible with the BRFSS which allows for county level data, provides more community-level information for local assessment and decision making. Data from the BRFSS and County-Level Study are each reported as age-adjusted rates except in the case of age-specific analyses.

The Youth Risk Behavior Survey (YRBS) provides risk factor data for high school students (ninth through twelfth grades). The YRBS is also the product of a sampling design that allows for information to be generalized to the population at large.[6] National data are also available for comparison.

Missouri participates in the Pregnancy Risk Monitoring System (PRAMS) which collects data on a sample of all women who have had a recent live birth in order to answer questions about pregnancy and the first few months after birth. The sampling methods employed ensure the findings are generalizable.[7] PRAMS data were obtained from internal DHSS partners as well as from a CDC site that presents Missouri's data alongside findings from other states, allowing for a national median to be calculated for comparison.

Data on cleft lip, cleft palate, and other craniofacial defects included in this report were provided by the DHSS Birth Defects Registry and were selected from Missouri resident live births during a specific period of time.

Missouri and national statistics for oral and pharynx cancer were obtained from the CDC's National Program of Cancer Registries; the Missouri Cancer Registry contributes to this data system which allows for comparisons at state and national levels by sex, race, and ethnicity.

Missouri is fortunate to have the Missouri Information for Community Assessment (MICA) system which displays Patient Abstract System data, including inpatient hospitalizations and emergency department (ED) visits. These data include figures by payment source, race, ethnicity, age, sex, and county of residence for ED visits and inpatient hospitalizations, charges and days of care. MICA data are age-adjusted using the 2000 standard population; data for specific age groups are crude rates.

Missouri Demographics

Approximately six million individuals reside in Missouri. About a quarter of Missourians are children younger than 18 years of age. About 62% are adults 18 to 64 years old, and 14.7% are 65 years and older. There are slightly more females than males statewide, especially among adults 65 years and older.[8]

Missouri Population by Age Group and Sex, 2012 Population Estimates			
Age Group	**Female**	**Male**	**Both Sexes**
Under 18 Years of Age	11.4%	11.9%	23.3%
18 to 64 Years of Age	31.3%	30.7%	62.0%
65 Years and Older	8.3%	6.4%	14.7%
All ages	51.0%	49.0%	100%

Data Source: Missouri Information for Community Assessment

The majority of Missouri's population is white; 12.4% are African American and about 3% are other races (including Asians, Pacific Islanders, and Native Americans). Only about 4% of Missourians are of Hispanic ethnicity. [8]

Missouri Population by Race, 2012 Population Estimates	
White	84.9%
African American	12.4%
Other Races	2.7%

Data Source: Missouri Information for Community Assessment

Missouri is comprised of 14 urban and 101 rural counties, based on population density and proximity to a Metropolitan Statistical Area. Even though the majority of Missouri's geographic area is considered rural, only 37% of Missouri's population lives in a rural area. The majority of the population is urban (63%).[9]

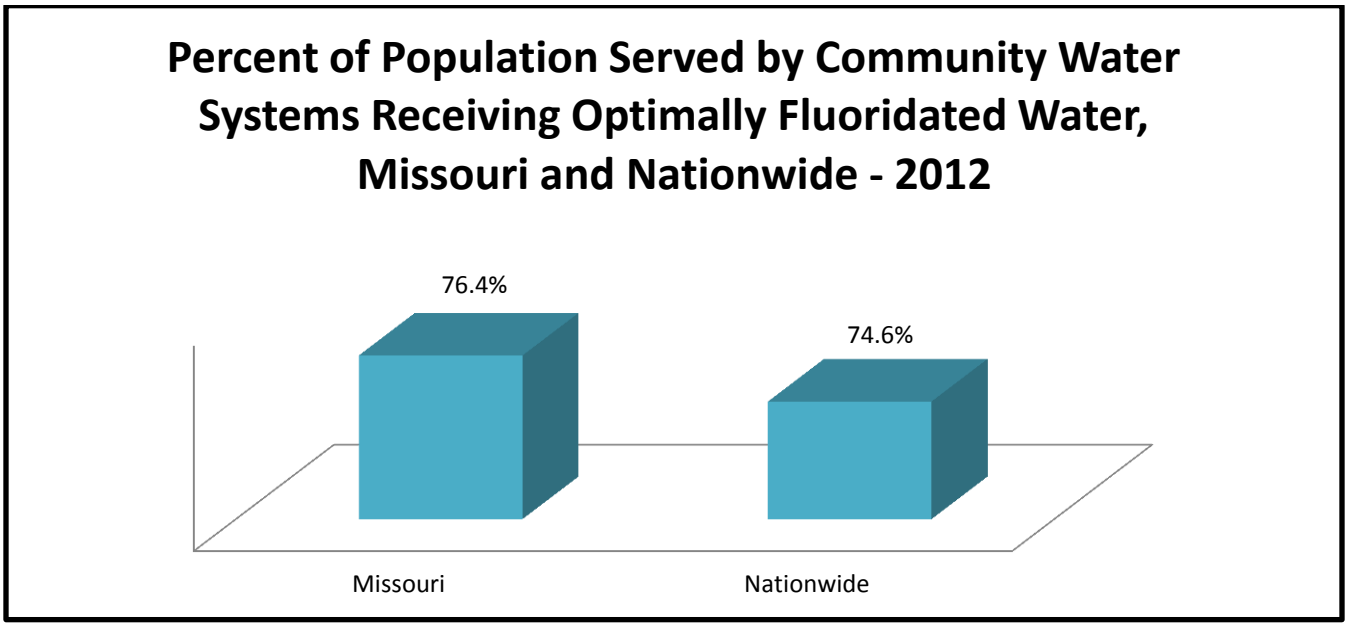
About 16.2% of Missourians are living in poverty, defined as 100% of the Federal Poverty Level (FPL) established by the United States Department of Health and Human Services (HHS) poverty guidelines; this is slightly higher than the percentage reported for the United States as a whole (15.9%).[10] According to 2012 statistics from the Missouri Department of Elementary and Secondary Education, 61% of schools (by building) reported having at least 50% of students eligible for free or reduced school lunch fees.[11]

Community Water Fluoridation

Tooth decay occurs when bacteria on the teeth produce acids that dissolve tooth enamel. Fluoride in various forms has been demonstrated to slow this process called demineralization; fluoride also increases remineralization. This process of decreasing demineralization and increasing remineralization is essential for the prevention and control of dental caries, also called tooth decay.[12]

Community water fluoridation (CWF) is a safe and effective way to prevent tooth decay. It is also the most cost effective way to provide protection from cavities to individuals of all ages and socioeconomic groups.[13] Missouri communities have been participating in CWF since 1954.

Current national data show that about 74.6% of all individuals served by community water systems are receiving optimally fluoridated water. That is, fluoride levels within water that are adjusted to ensure they are within the 0.7 to 1.2 parts per million (ppm) range recommended by HHS. A slightly higher percentage is reported for Missouri, at 76.4%, which is just below the current Healthy People 2020 objective of 79.6%.[13,14] This target is within reach for Missouri, provided that attention and support are given to this important preventive measure. Please see Appendix 1 and visit http://health.mo.gov/fluoride for more information on fluoride in specific communities.



Data Source: CDC's Water Fluoridation Reporting System

Children

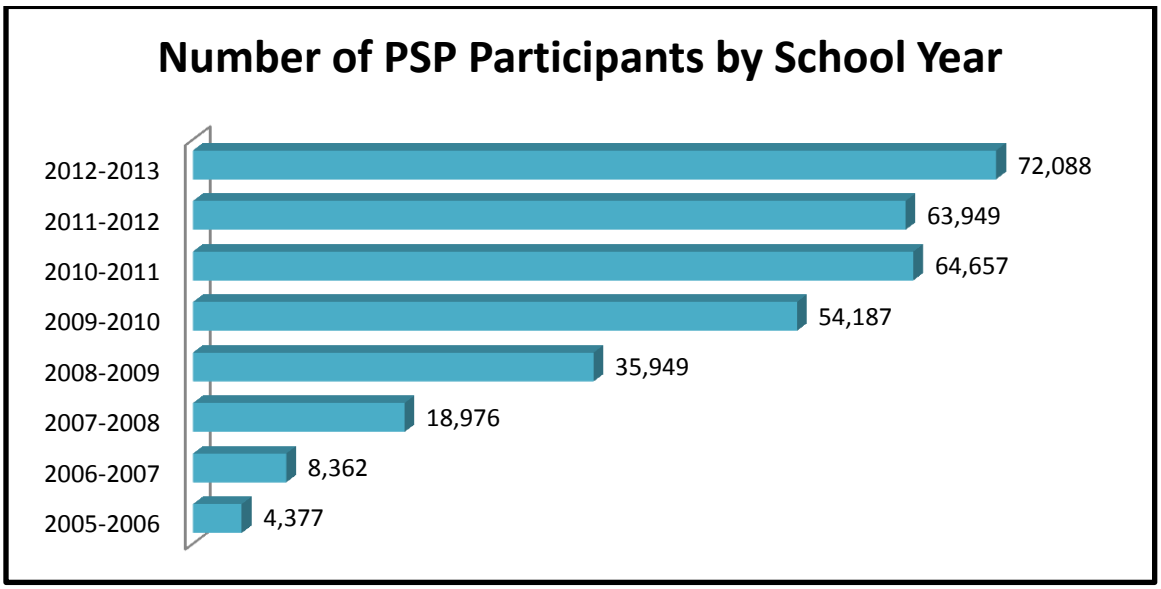
Dental caries have been called the single most common chronic childhood disease.[1] Left untreated, tooth decay can result in problems with eating, speaking, and learning. Poor oral health may lead to inadequate nutrition, pain, infection, missed school, depression, and low self-esteem – all of which impact the ability to learn. Children from low-income families are at greater risk for poor oral health and its consequences.[15]

Fluoride Varnish

Fluoride varnish can help reduce a child's risk of developing dental caries. The fluoride varnish is topically applied to the outer surfaces of teeth and it is safe to apply outside of a dental office, such as in community-based fluoride varnish programs. Fluoride varnish programs have been recognized by the ASTDD as an evidence-based approach, especially when the product is applied every six months. The ASTDD also states that fluoride varnish programs should integrate education as well as the application of topical fluoride.[12]

Missouri's PSP follows the model of an evidence-based fluoride varnish program. Participants receive oral health education, supplies (such as toothbrush, toothpaste, and dental floss), an oral health screening, and an application of fluoride varnish. The varnish is applied twice per school year for each child.

The PSP is a voluntary program that is provided to any school, day care center, Head Start, or other group that wishes to participate. The MOHP employs five regional Oral Health Consultants who coordinate PSP events in nearly every Missouri county. This strategy has been successful; the PSP has been growing each year since its inception during the 2005-2006 school year, with more than 72,000 children served in the 2012-2013 school year.

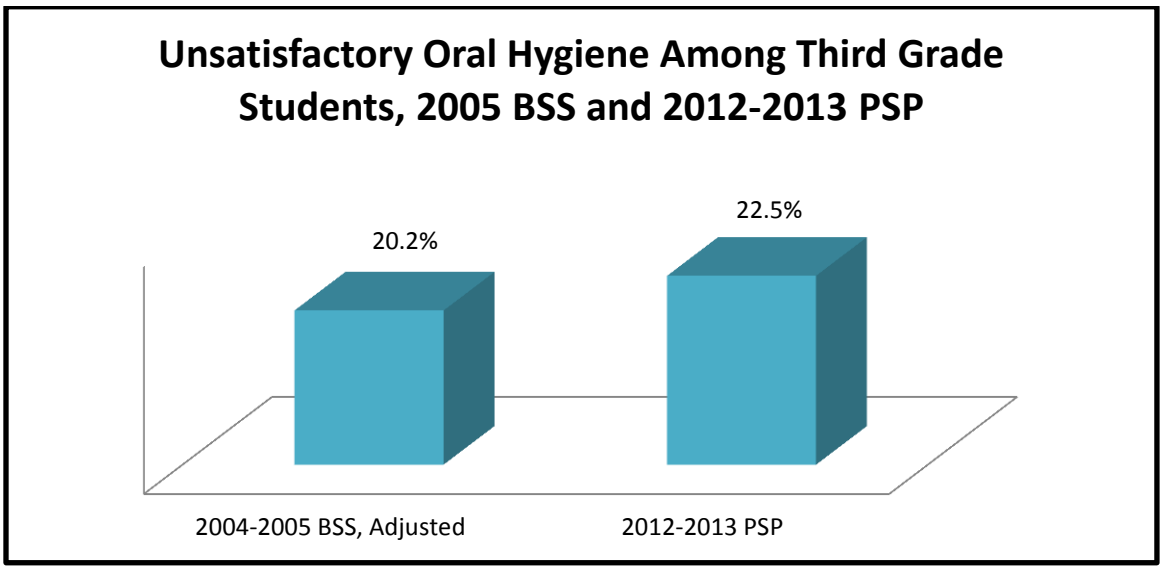


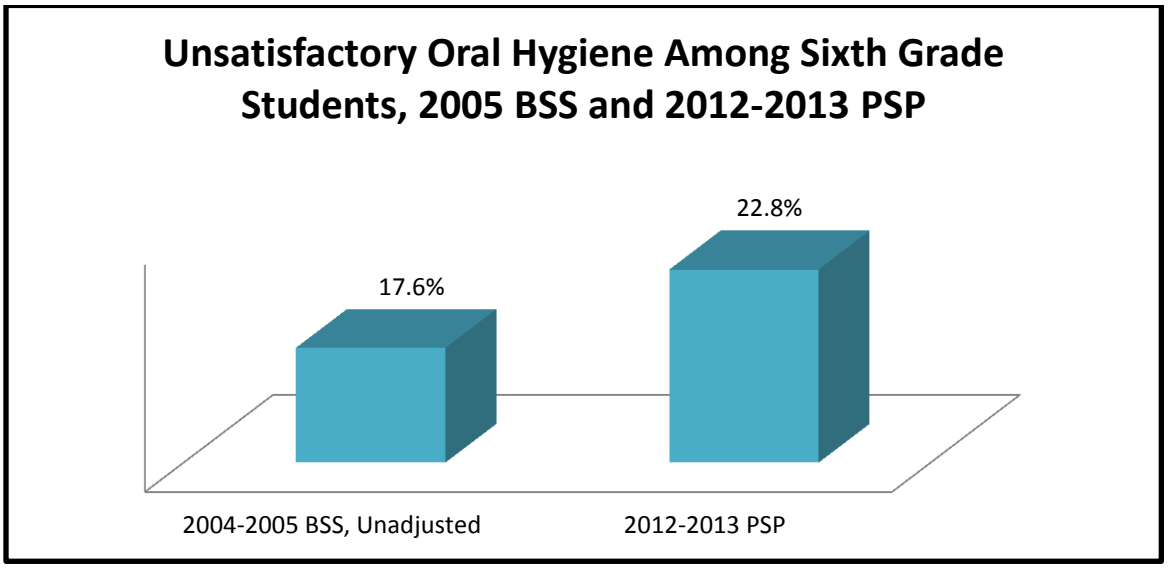
The PSP is a voluntary program; however, as noted in the methodology section, results from third and sixth grade PSP screenings in the 2012-2013 school year are reported alongside the 2005 BSS, which

was conducted on a random sample of third and sixth grades. This provides additional context for each screening's results. National comparisons are available through the NOHSS, but only for specific measures and only for third grade students among the 43 states that shared their BSS findings. When available, comparisons to relevant Healthy People 2020 objectives are also provided. Additional PSP findings for participants of all grade levels are reported so measures can be examined by demographic factors like sex, race, ethnicity, and age group.

Oral Hygiene

Maintaining satisfactory hygiene is another important strategy for preventing tooth decay. According to BSS and PSP findings, between 20 and 22.5% of third graders had unsatisfactory oral hygiene, including visible plaque and inflamed oral tissues. Fewer sixth graders had unsatisfactory oral hygiene in the 2005 BSS, at about 18%. A greater proportion of third and sixth grade students were identified as having unsatisfactory oral hygiene in the 2012-2013 PSP screening than in the 2005 BSS.

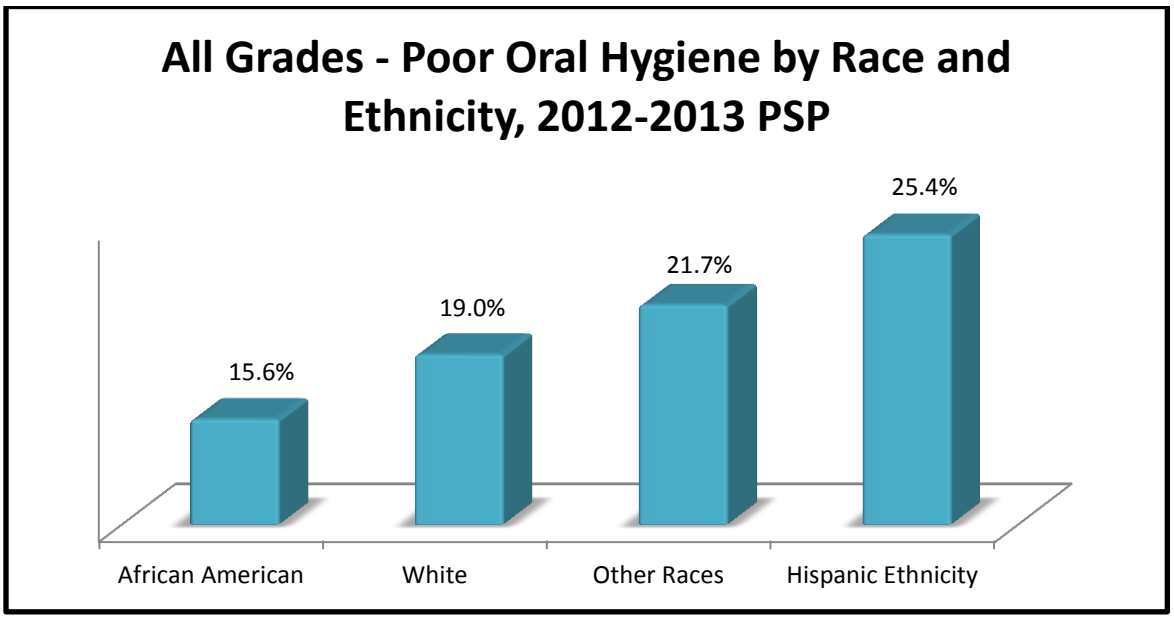




During the 2012-2013 school year, poor oral hygiene was noted among about 19% of participants of all ages. The percent with poor oral hygiene was lower among younger children in general but higher among males of all ages.

Poor Oral Hygiene by Sex and Age Group, 2012-2013 PSP			
Age Group	**Female**	**Male**	**Total**
Under 5	10.2%	11.0%	10.6%
5 to 12 Years Old	18.3%	21.9%	20.2%
13 and Older	16.2%	23.6%	20.0%
All Ages	17.4%	21.0%	19.2%

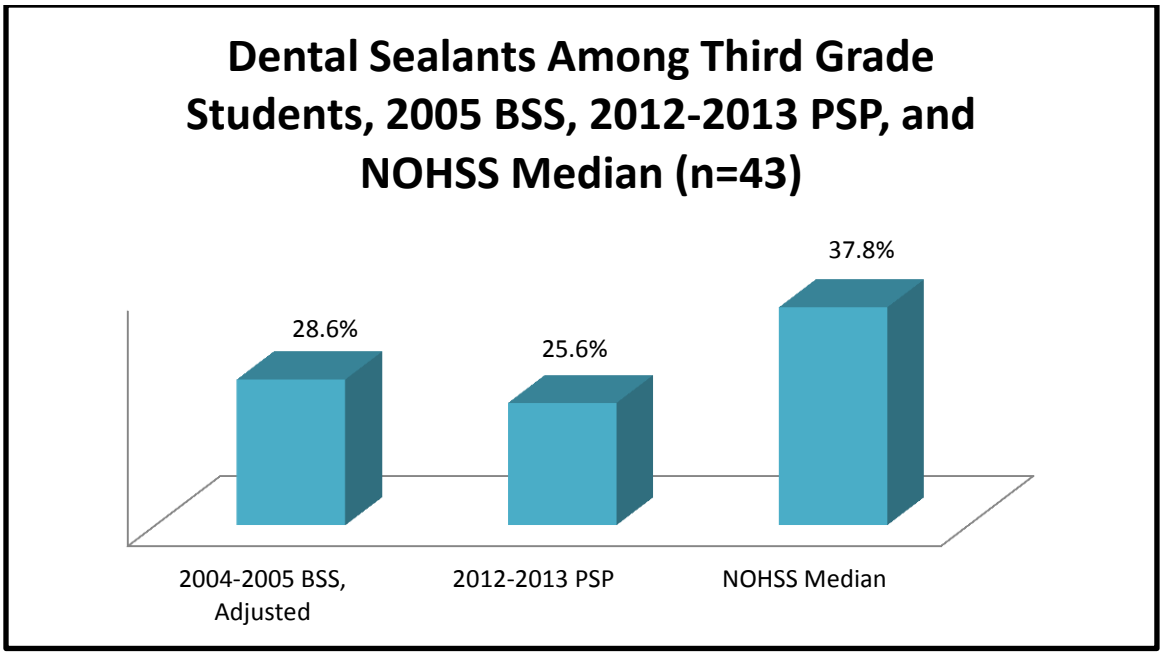
Poor oral hygiene was noted most frequently among Hispanic children and least frequently among African American children.

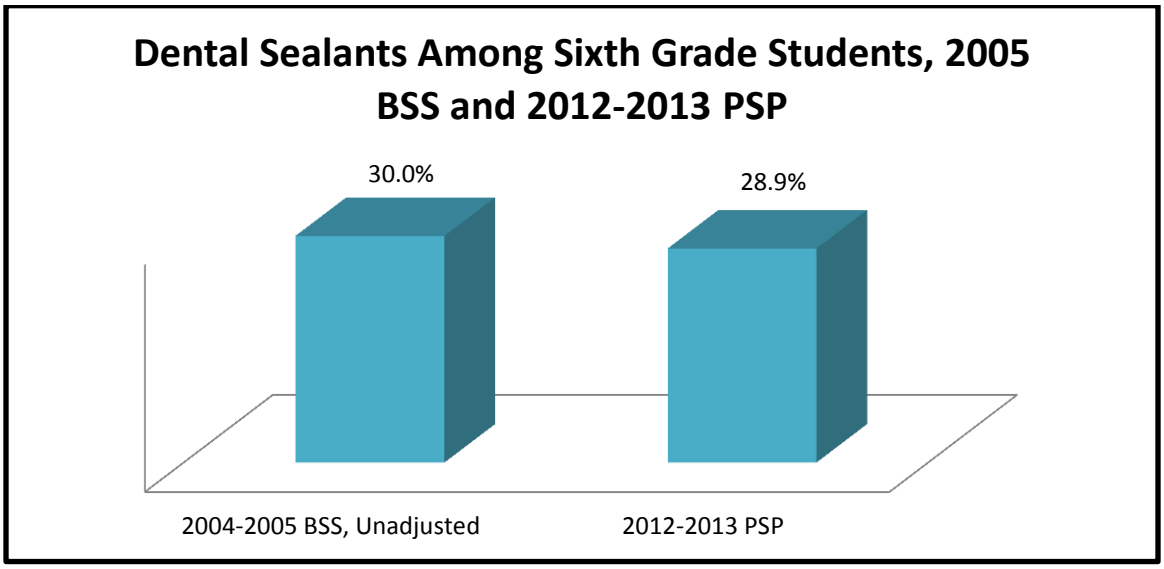


Dental Sealants

Dental sealants are thin plastic coatings applied to the chewing surfaces of back teeth where tooth decay often occurs in children. Typically, dental sealants are applied to permanent molar teeth soon after they have erupted. The first molars usually erupt around age six and the second molars tend to erupt by age twelve. Dental sealants can be applied easily and last for five to ten years.[16]

Based on data for 43 states included in the NOHSS, the median percentage of third grade students with dental sealants was 37.8% (range: 23.5% to 66.1%).[17] This is higher than the percentage observed for Missouri's third graders in both the 2005 BSS and 2012-2012 PSP. About 30% of sixth grade students screened in both the BSS and PSP had dental sealants.



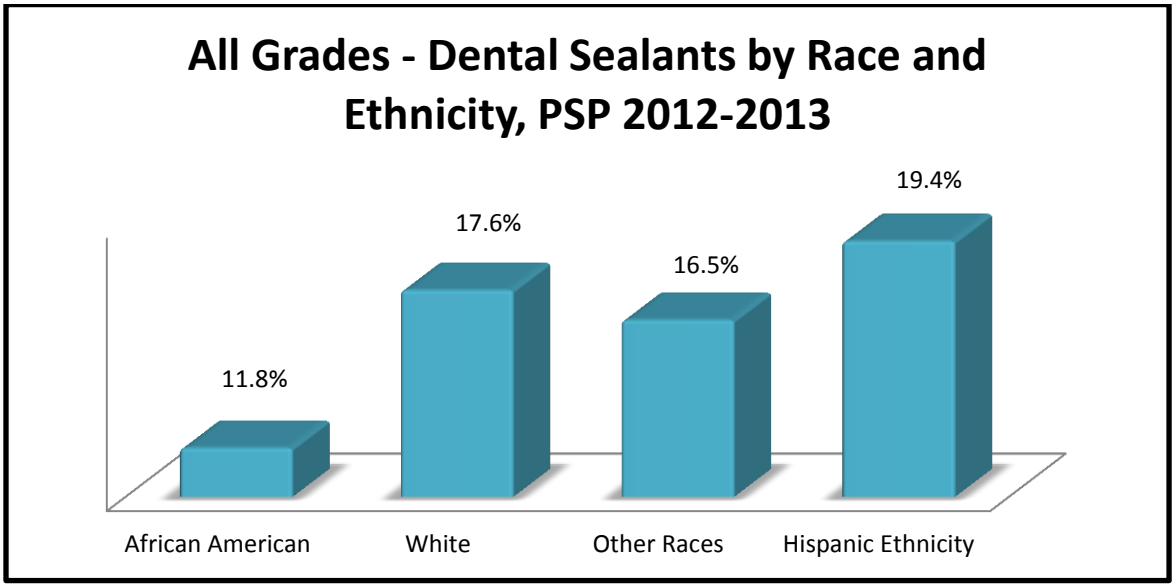


The Healthy People 2020 objective related to dental sealants that is the most comparable to BSS and PSP findings is: increase the proportion of children 6 to 9 years of age with dental sealants on at least one permanent molar to 28.1%.[14] Although third and sixth graders are typically between 8 and 11 years old, this goal does provide a basis for goal setting by the MOHP and its partners for dental sealants among school children.

Among PSP participants of all ages/grades in the 2012-2013 school year, about 17% had dental sealants. Most guidelines recommend that sealants are placed on newly erupted permanent teeth, so the rate of dental sealants is higher among older children, as expected.

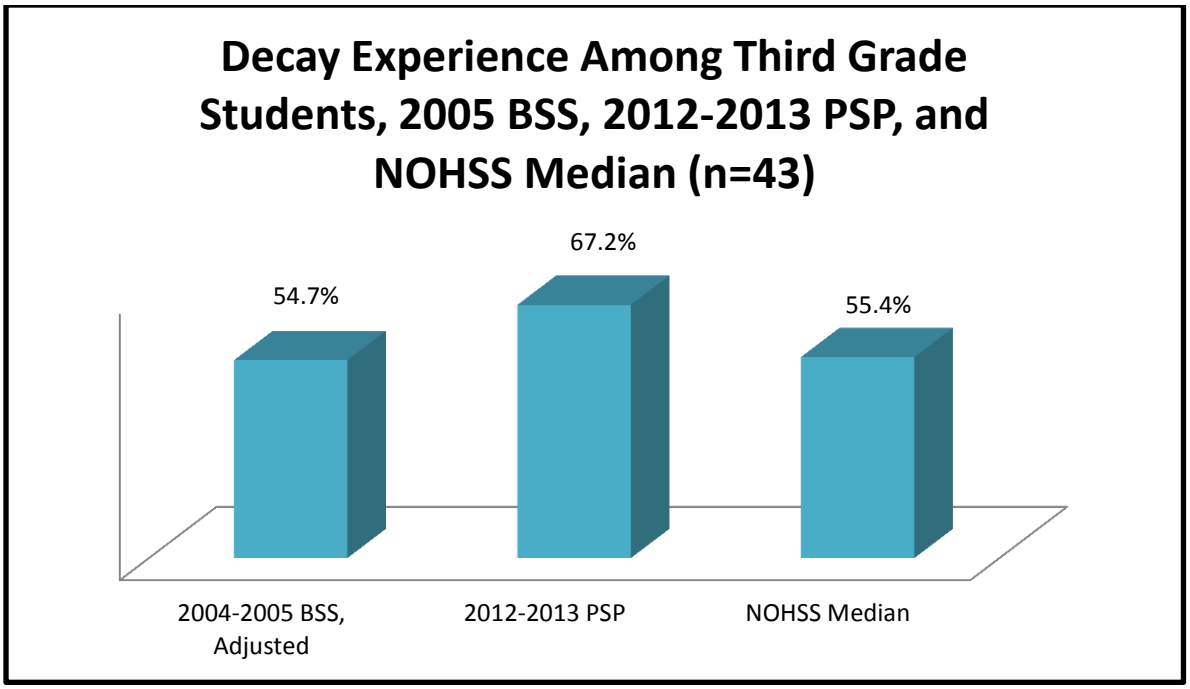
Percent with Dental Sealants by Gender and Age Group, PSP 2012-2013			
Age Group	**Females**	**Males**	**Total**
Under 5	1.0%	1.2%	1.2%
5 to 12 Years Old	19.7%	17.4%	18.5%
13 and Older	22.5%	23.5%	23.0%
All Ages	18.0%	16.2%	17.1%

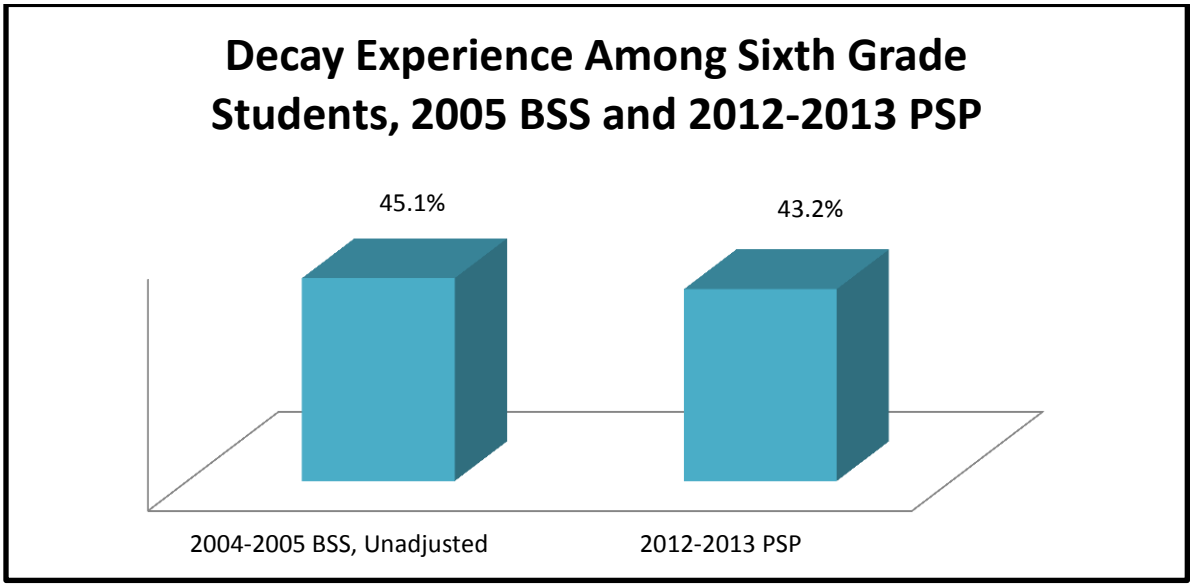
Dental sealants were observed most frequently among white and Hispanic children and least frequently among African American children.



Decay Experience

Decay experience is a measure of any treated or untreated decay found on any primary or permanent teeth during screening. For third graders, the BSS 2005 and PSP percentages were very similar. Among third grade students only, the national median for the 43 states whose data appear in the NOHSS was 55.4%, which is very close to what is observed for Missouri with currently available data (55.2%). For sixth graders, decay experience was also similar among BSS and PSP participants.

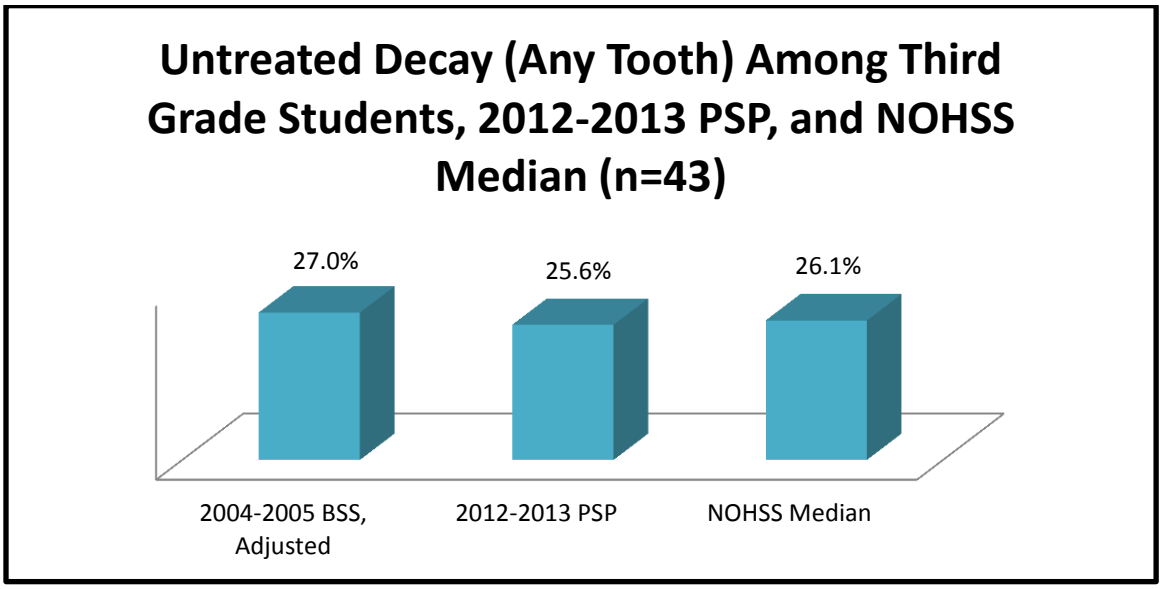


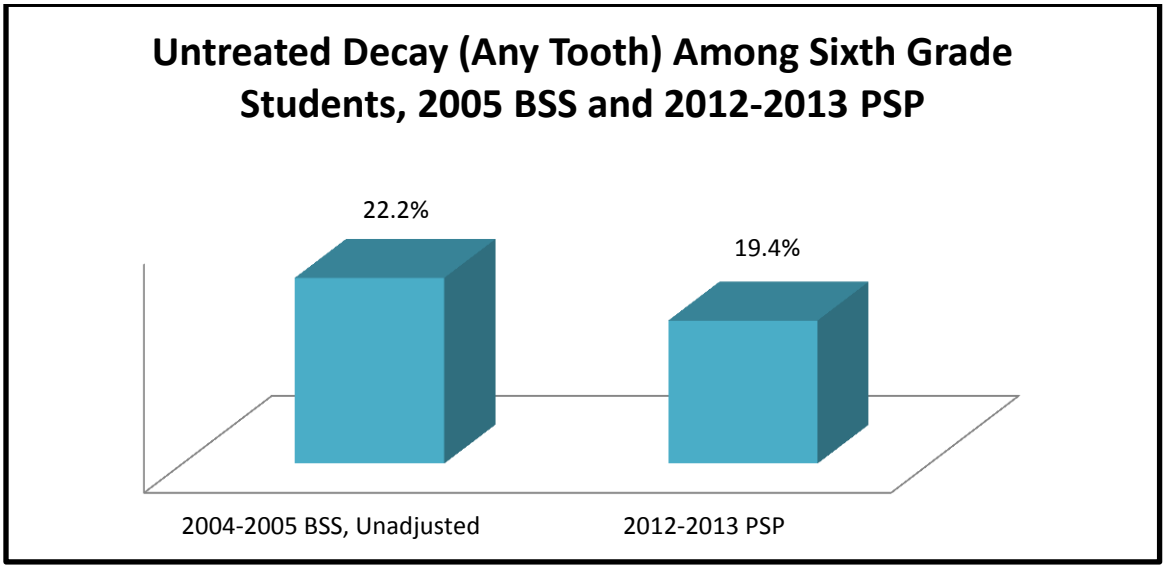


A Healthy People 2020 national objective has been set regarding decay experience (also called dental caries experience): reduce the proportion of children aged 6 to 9 with dental caries experience in at least one primary or permanent tooth; the target was set at 49%. Although the age groups do not quite match with the BSS-based grade levels screened, this does provide the basis for a Missouri-specific goal to reduce decay experience among grade school children.

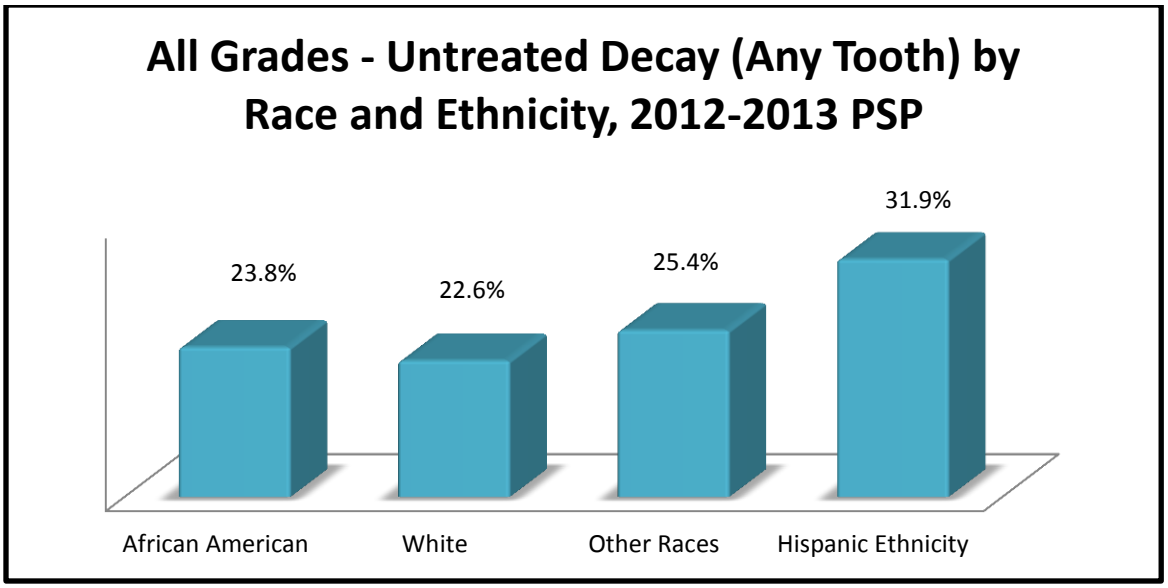
Untreated Decay

The percentage of students with untreated decay is similar between the 2005 BSS and the 2012-2013 PSP participants of both grades examined. Among just third graders, the national median for the 43 states whose data appear in the NOHSS was 26.1%, which is similar to findings from both PSP and the BSS.





When untreated decay is examined by race and ethnicity for the whole PSP population (not just third or sixth graders), the highest percentage was observed among Hispanic children.

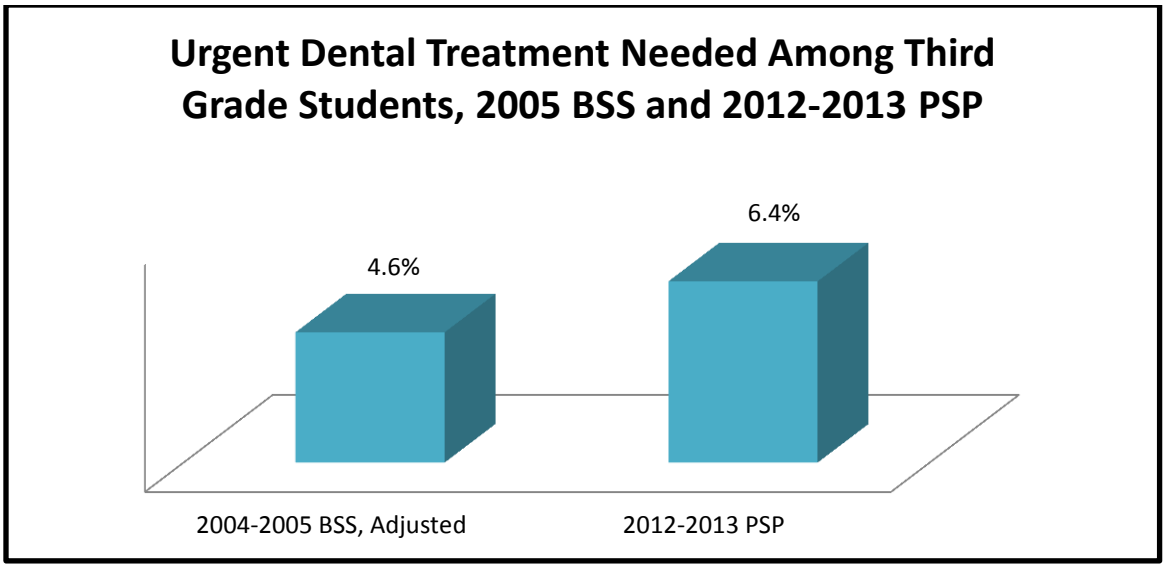


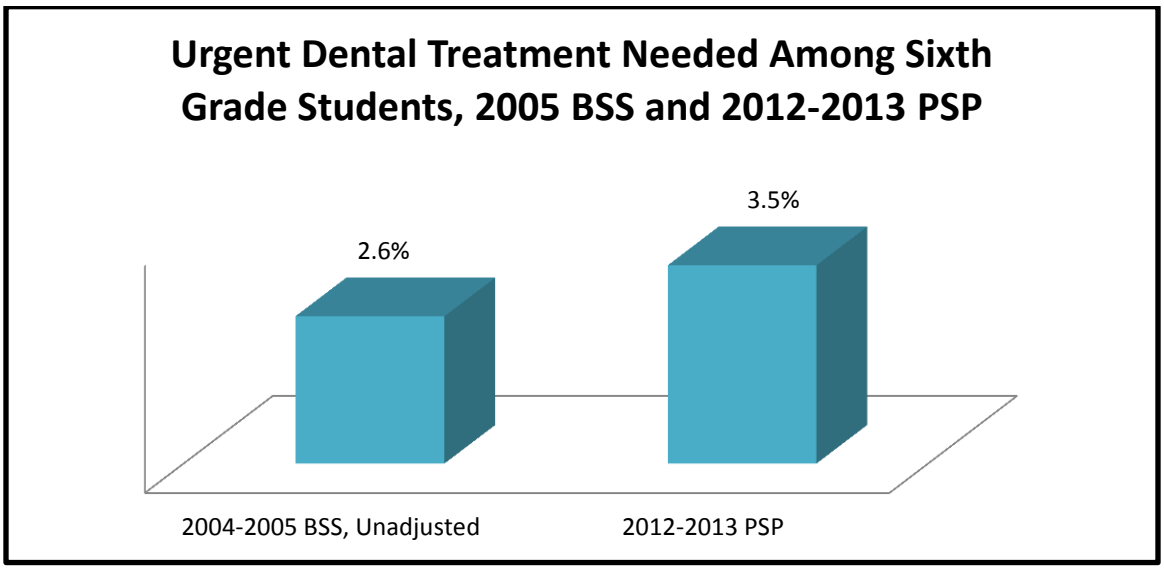
The Healthy People 2020 national objective that relates to untreated decay is: reduce the proportion of children aged 6 to 9 with untreated decay in at least one primary or permanent tooth; the target was set at 25.9%. This is very close to the percentage observed among third grade Missouri students and higher than was observed for sixth graders according to both the BSS and PSP results.

Urgent Dental Treatment Needed

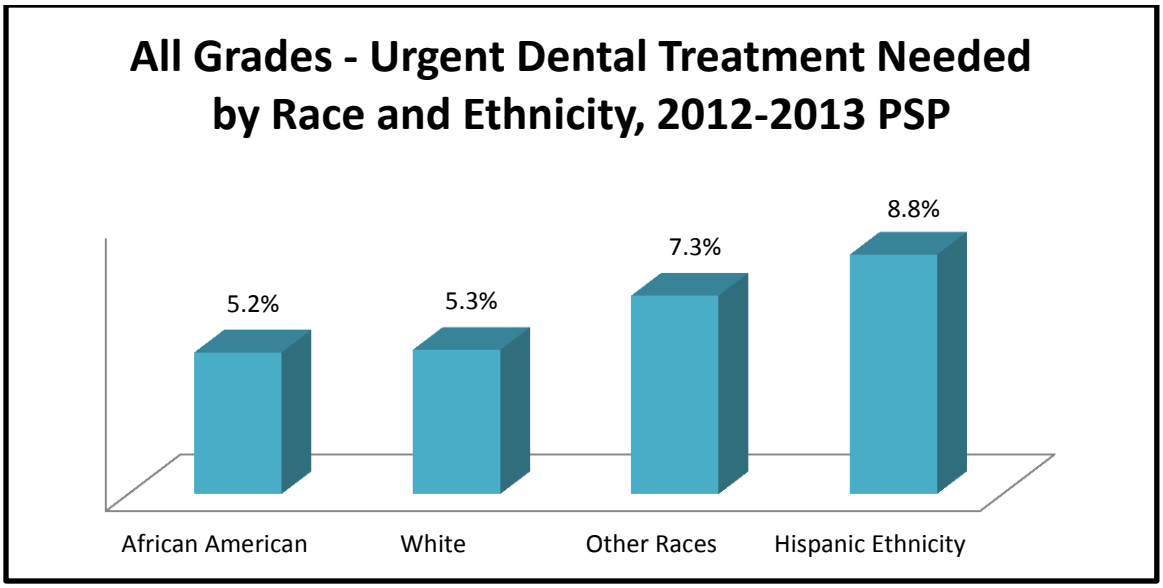
Within PSP, parents or guardians are notified when a dental issue is identified that needs to be addressed. PSP organizers provide referrals for local dental offices or clinics that may be utilized for follow-up care. The need for treatment is categorized in two ways. Early dental care is recommended for injuries or conditions that require the attention of a dental professional in a few months' time. Urgent dental care is recommended to take place within 24 hours because the injury or condition needs immediate attention.

Urgent dental treatment needs were also recorded on the 2005 BSS. A smaller percentage of third and sixth graders in the BSS were identified as having urgent dental needs than the PSP group. There were no national data available for comparison on this variable.





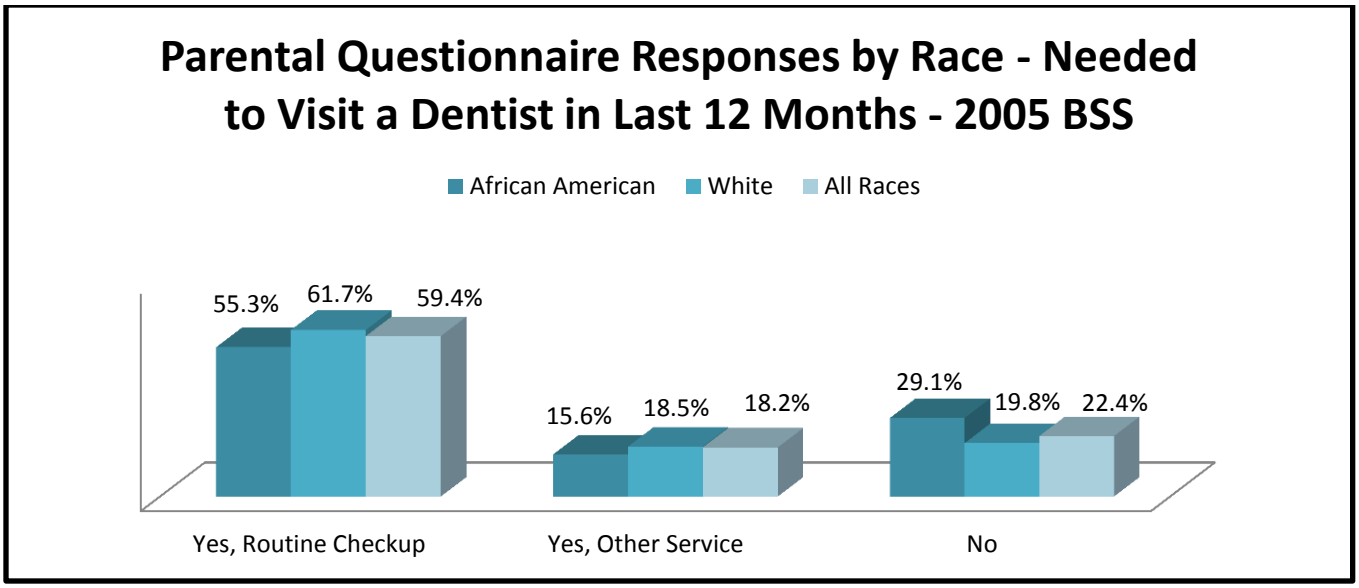
As was seen in the grade categories examined above, overall, the majority of children screened in the 2012-2013 school year for PSP did not have an urgent dental need, however, this was observed more frequently among Hispanics and other races than whites or African Americans.



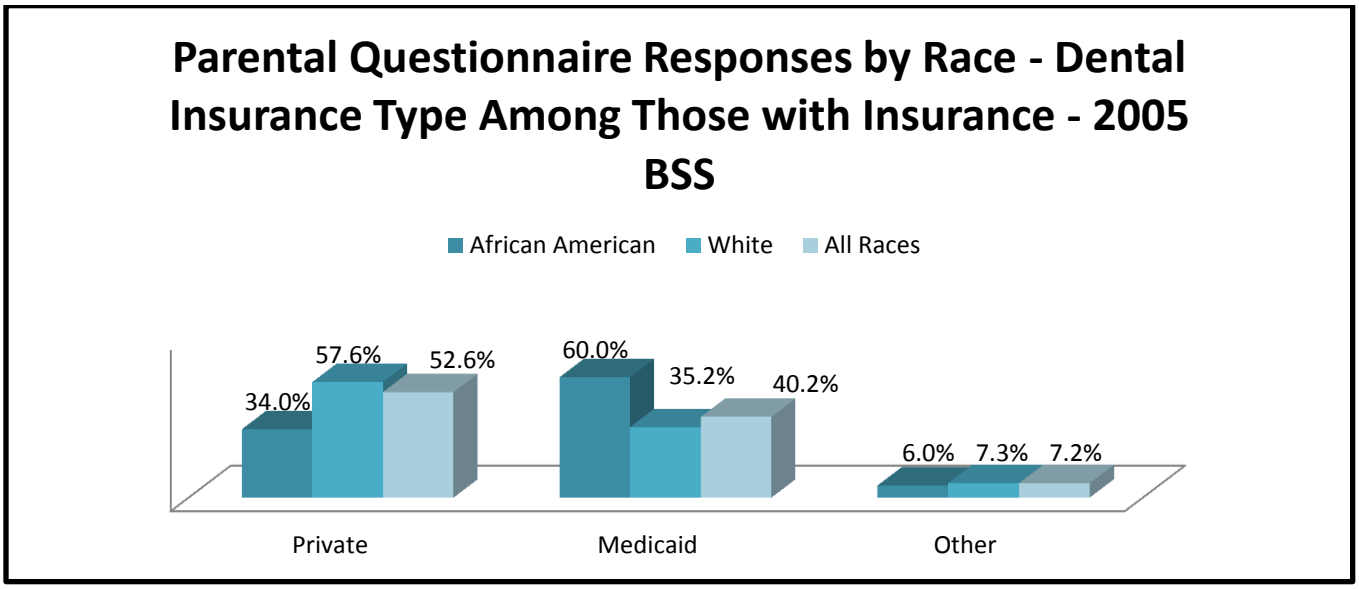
Dental Visits and Coverage

The American Academy of Pediatric Dentistry (AAPD) recommends that parents take their children to the dentist as soon as their first tooth erupts or by their first birthday. The AAPD also recommends that children visit the dentist every six months, but parents should discuss how often their particular child needs to see a dentist based on their individual needs.[18]

Currently, the best information on dental visits and coverage among children comes from the 2005 BSS, when a survey was sent to parents or guardians of all third and sixth grade students at schools selected for the BSS. In total, 2,259 questionnaires were returned. About 60% of parents reported that their child visited a dentist for a routine checkup, about 18% visited for another dental service, and about 22% did not have a need to a visit a dentist in the last twelve months. Among African Americans, a lower percentage reported that their child visited a dentist for either a routine checkup or other service than among whites, and nearly 30% reported not needing to see a dentist. The BSS survey shows that nearly 78% of all children visited a dentist for either a routine checkup or for another service.[2]



The 2005 BSS survey also asked parents and guardians about dental insurance coverage. About 77% of parents reported that their children had some kind of dental coverage, including private dental insurance, Medicaid, and other types. Overall, about 53% had private insurance and 40% had Medicaid dental coverage. When this is examined by race, the most common insurance type among African Americans was Medicaid while the most common type among whites was private insurance.



Nutrition

The YRBS collects data on a variety of health-related behaviors among high school students (ninth through twelfth grades).[6] The table below displays findings related to diet and nutrition for Missouri participants in 2009. Students were asked to report dietary behaviors they engaged in over the last week. About 13% did not eat any fruit in the last week while about 44% did eat fruit or drink 100% fruit juices, but less than once daily in the last week. A small percentage reported did not eat any

vegetables (not including potatoes) and about 40% ate vegetables, but less than once a day over the last week. About a third of students drank at least one soda or pop (defined as one can, bottle, or glass) per day and only about 13% had three or more sodas per day.

High School Students – Percent that Reported Selected Dietary Behaviors In the Last Week, Missouri, 2009	
Did not eat fruit	13.3%
Ate fruit or drank 100% fruit juices, but less than one time per day	44.1%
Did not eat vegetables (does not include potatoes)	6.7%
Ate vegetables, but less than one time per day	37.5%
Drank soda or pop one or more times per day	31.5%
Drank soda or pop two or more times per day	22.1%
Drank soda or pop three or more times per day	12.7%

Data Source: Youth Risk Behavior Survey

About 3.6% YRBS participants vomited or took laxatives to lose weight in the 30 days before the survey. The percentage that reported vomiting was higher among females than males, which is consistent with national trends on bulimia. This is significant because up to 89% of bulimics have evidence of tooth erosion; bulimia can cause teeth to change in color, shape, and length.[19]

Cleft Lip and Palate

Cleft lip and cleft palate are birth defects called "orofacial clefts" that occur when a baby's lip or mouth do not form properly. Individuals may have a cleft lip, a cleft palate, or both. Cleft lip and cleft palate are among the most common birth defects in the United States. According to national statistics, one in 33 babies is born with a birth defect (about 3%).[20]

The table below shows that between 2001 and 2009, 490 cases of cleft palate and 772 cleft lip cases with or without cleft palate were reported among resident live births in Missouri.[21] Cleft palate occurs at a rate of about 1 in 1,574 live births nationally each year; Missouri's rate of 6.9 per 10,000 live births in the time period examined equates to about 1 in 1,449 live births, which is slightly higher than the national rate. Cleft lip with or without cleft palate occurs at a rate of 1 in 940 live births nationally each year; Missouri's equivalent rate is similar, at 1 in 917 live births.[22] National statistics show that cleft lip and palate incidence is higher among non-Hispanic whites than any other group; due to small numbers this was not examined by race or other demographics for Missouri.[23]

During the time period examined, 1,716 infants were identified with anomalies of the skull and face bones; however, no national data were located on this group of anomalies for comparison.

Selected Missouri Resident Birth Defects and Craniofacial Anomalies: Counts and Rates per 10,000 Resident Live Births, 2001-2009		
	Defects	**Rate per 10,000 Live Births**
Cleft palate only	490	6.9
Cleft lip (with or without cleft palate)	772	10.9
Anomalies of skull and face bones	1,716	24.3

Data Source: Missouri Birth Defects Registry

In general, women of childbearing age should be aware of recommendations to prevent birth defects, such as taking the recommended daily dose of folic acid and avoiding smoking and drinking during pregnancy. Specifically, research has shown that smoking during pregnancy and having diabetes before pregnancy each increase the risk of orofacial defects.[20]

The long-term consequences of orofacial clefts may include ear infections, hearing loss, problems with teeth, and difficulty feeding and talking. Beginning in early childhood, children with these defects often need surgery and ongoing services and treatment such as speech therapy and special dental and orthodontic care.[23]

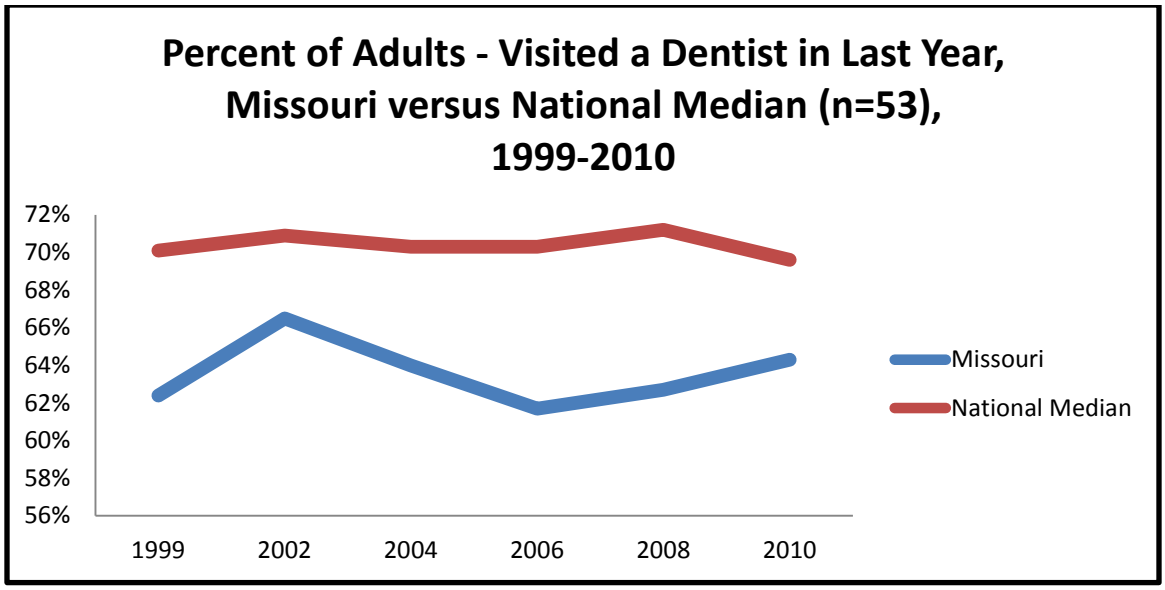
Adults

Oral health questions are asked every other year on the BRFSS. Trend data are reported; however, due to changes in BRFSS sampling methodology, the 2012 results are not reported on the same trend line as previous years' findings, in compliance with CDC recommendations. National data were obtained using the median for all 50 states plus District of Columbia and two territories (n=53).[5]

Dental Visits

The recommendation for frequency of dental visits varies among individuals, however most healthy adults should visit a dentist at least once per year. During this visit, a dentist or dental hygienist will examine the teeth and gums, look for broken or damaged teeth, and will look for signs or oral cancer. Additionally, teeth will be cleaned to remove plaque and tartar in order to prevent tooth decay. Dental professionals often educate patients about proper brushing and flossing techniques, good dietary practices, avoiding tobacco products, and ways to avoid injuring teeth and gums.[1]

Among adults, each year Missouri residents reported visiting a dentist in the last year at a lower percentage than was observed nationwide each year, including 2012. In 2012, about 62% of Missouri adults visited a dentist in the last year compared to about 67% nationally.[5]



Data Source: National BRFSS Site

Percent of Adults – Visited a Dentist in the Last Year, Missouri versus National Median (n=53), 2012	
Missouri	61.8%
National Median	67.2%

Data Source: National BRFSS Site

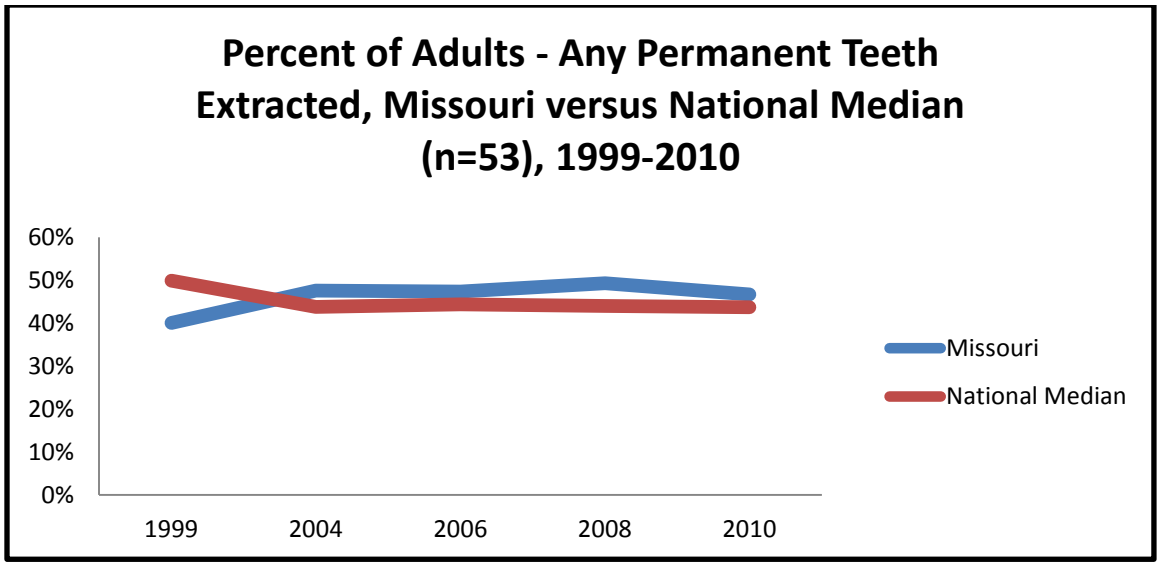
According to the Missouri 2012 BRFSS, the percentage of females that visited a dentist in the last year was higher than among males. The trend varied by age group without following a distinct pattern. When examined by race and ethnicity, white and Hispanic adults reported visiting a dentist more frequently than other groups. Higher percentages were observed as both annual income and educational attainment increased.[24]

Percent of Adults – Visited a Dentist in the Last Year Missouri, 2012	
Overall	***61.8%***
Sex	
Female	65.0%
Male	58.3%
Age Group	
18 to 24 Years Old	63.9%
24 to 34 Years Old	58.2%
35 to 44 Years Old	63.4%
45 to 54 Years Old	61.2%
55 to 64 Years Old	66.5%
65 Years and Older	58.7%
Race	
African American	57.7%
White	62.8%
Other	54.3%
Ethnicity	
Hispanic	60.8%
Education	
Less than High School	35.9%
High School or G.E.D.	58.7%
Some Post-High School	64.1%
College Graduate	77.9%
Annual Income	
Less than $15,000	37.2%
$15,000-24,999	44.1%
$25,000-34,999	56.8%
$35,000-49,999	60.7%
$50,000 and Greater	79.7%

Data Source: Missouri 2012 BRFSS Report

Tooth Loss

Adults were asked "how many of your permanent teeth have been removed because of tooth decay or gum disease?" on the BRFSS in 1999 and then every other year between 2004 and 2012. For every year except 1999, the percent of adults with at least one permanent tooth extracted due to decay was higher among Missouri residents than was observed for the nation as a whole, including for 2012.[4]



Data Source: National BRFSS Site

Percent of Adults – Any Permanent Teeth Extracted, Missouri versus National Median (n=53), 2012	
Missouri	48.0%
National Median	44.5%

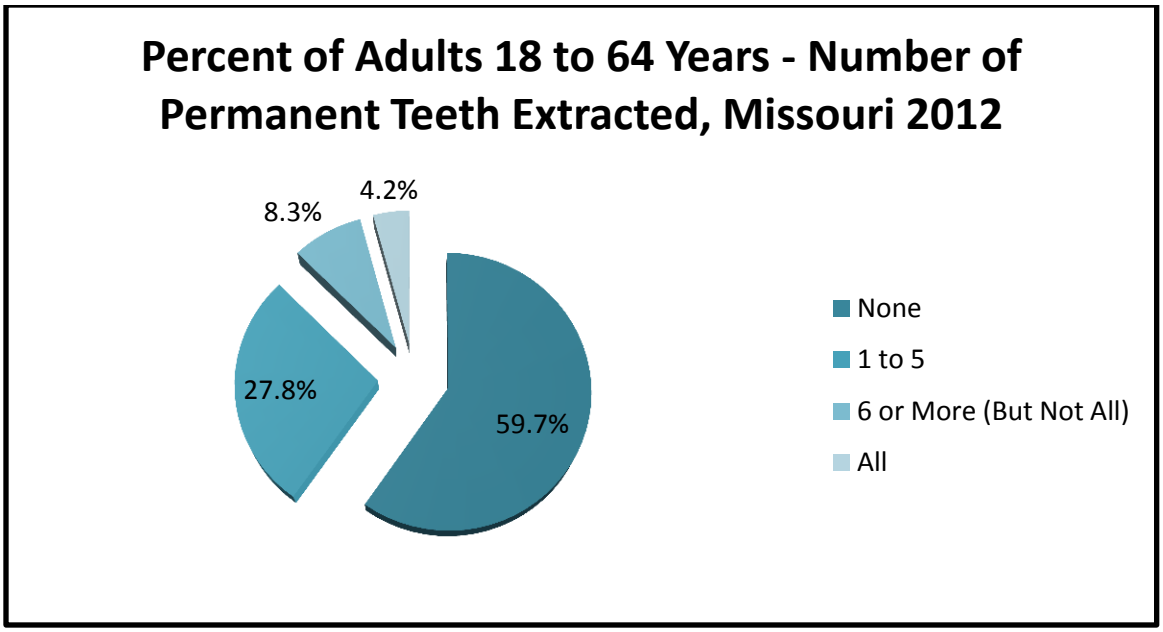
Data Source: National BRFSS Site

Nearly half of all Missouri adults had at least one permanent tooth extracted due to decay or gum disease according to the 2012 data. This percentage is slightly higher among females than males. The percentage increased with age, with the highest percentage observed among individuals aged 65 years and older. The percentage was higher among African Americans than other racial or ethnic groups. Lower income and educational attainment levels were also associated with higher percentages of tooth loss.[24]

Percent of Adults – Any Permanent Teeth Extracted – Missouri 2012	
Overall	***48.0%***
Sex	
Female	49.2%
Male	46.8%
Age Group	
18 to 24 Years Old	10.7%
24 to 34 Years Old	32.6%
35 to 44 Years Old	36.8%
45 to 54 Years Old	50.3%
55 to 64 Years Old	64.2%
65 Years and Older	80.6%
Race	
African American	55.8%
White	47.1%
Other	45.5%
Ethnicity	
Hispanic	44.1%
Education	
Less than High School	72.0%
High School or G.E.D.	55.3%
Some Post-High School	43.6%
College Graduate	30.1%
Annual Income	
Less than $15,000	63.1%
$15,000-24,999	59.6%
$25,000-34,999	59.8%
$35,000-49,999	50.7%
$50,000 and Greater	34.9%

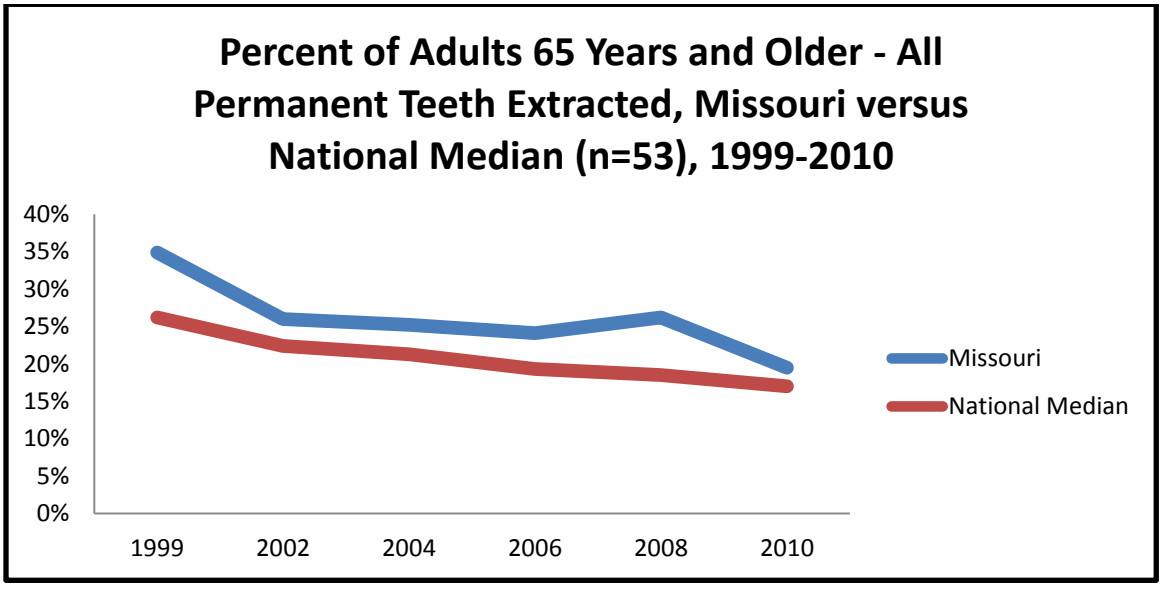
Data Source: Missouri 2012 BRFSS Report

When tooth loss is examined for just individuals 18 to 64 years of age, about 60% had not lost any teeth. About 30% had lost between one and five teeth, 8.3% had lost 6 or more (but not all), and about 4% of adults younger than 65 years of age had lost all of their permanent teeth due to decay or gum disease.[24]



Data Source: Missouri 2012 BRFSS Report

When tooth loss is examined for individuals 65 years and older, Missouri has had higher percentages than is observed nationwide (n=53) in every year examined. Missouri and national data are available for 1999 and then every other year between 2002 and 2010, with the 2012 data reported separately as discussed previously.



Data Source: National BRFSS Site

Percent of Adults 65 Years and Older – All Permanent Teeth Extracted, Missouri versus National Median (n=53), 2012	
Missouri	24.9%
National Median	16.1%

Data Source: National BRFSS Site

Among Missourians aged 65 years and older, about equal percentages of males and females had all their permanent teeth extracted due to decay or gum disease. Slightly higher percentages were observed among those 75 years and older than those 65 to 74 years old. Whites had higher rates than African Americans; insufficient numbers in this age group were available for other races or Hispanics. Individuals with higher educational attainment and annual income had lower percentages of complete tooth loss.

Percent of Adults 65 and Older – All Permanent Teeth Extracted – Missouri 2012	
Overall	***24.9%***
Sex	
Female	25.0%
Male	24.7%
Age Group	
65 to 74 Years Old	23.9%
75 Years and Older	26.2%
Race	
African American	20.8%
White	24.7%
Other	N/A
Education	
Less than High School	45.6%
High School or G.E.D.	26.8%
Some Post-High School	13.8%
College Graduate	5.9%
Annual Income	
Less than $15,000	41.0%
$15,000-24,999	33.8%
$25,000-34,999	21.0%
$35,000-49,999	20.4%
$50,000 and Greater	12.7%

Data Source: Missouri 2012 BRFSS Report

A Healthy People 2020 objective has been established for adults 65 to 74 years old, to reduce the proportion of these individuals who had lost all of their natural teeth to 21.6%.[14] Currently for Missouri, this proportion is around 24%. This information may be useful if interventions targeting oral health among older adults are implemented in Missouri either locally or statewide.

Chronically Ill

Linkages have been made between poor oral health outcomes such as tooth decay and periodontal disease and a variety of chronic health conditions.[1] According to data collected by the BRFSS in 2012, a higher percentage of Missouri adults reported they had been told by a doctor that they had five major chronic health indicators associated with poor oral health than was reported nationwide.[5]

Percentage of Population Affected by Selected Chronic Health Indicators, Missouri and National Median (n=53) – 2012		
	Missouri	**National Median**
Heart Attack/Myocardial Infarction	5.0%	4.5%
Angina/Coronary Heart Disease	4.9%	4.3%
Stroke	3.5%	2.9%
Arthritis	29.6%	25.5%
Diabetes (not including gestational or pre-diabetes)	10.7%	9.7%

Data Source: National BRFSS Site

In spite of the documented link between diabetes and periodontal disease,[1] according to the 2011 Missouri County-Level Study, only about 50% of adults with diabetes reported that they visited a dentist in the last year.[25] This is lower than was observed for Missouri adults overall (around 60%).[5,24]

Tobacco Use and Cancer Risk

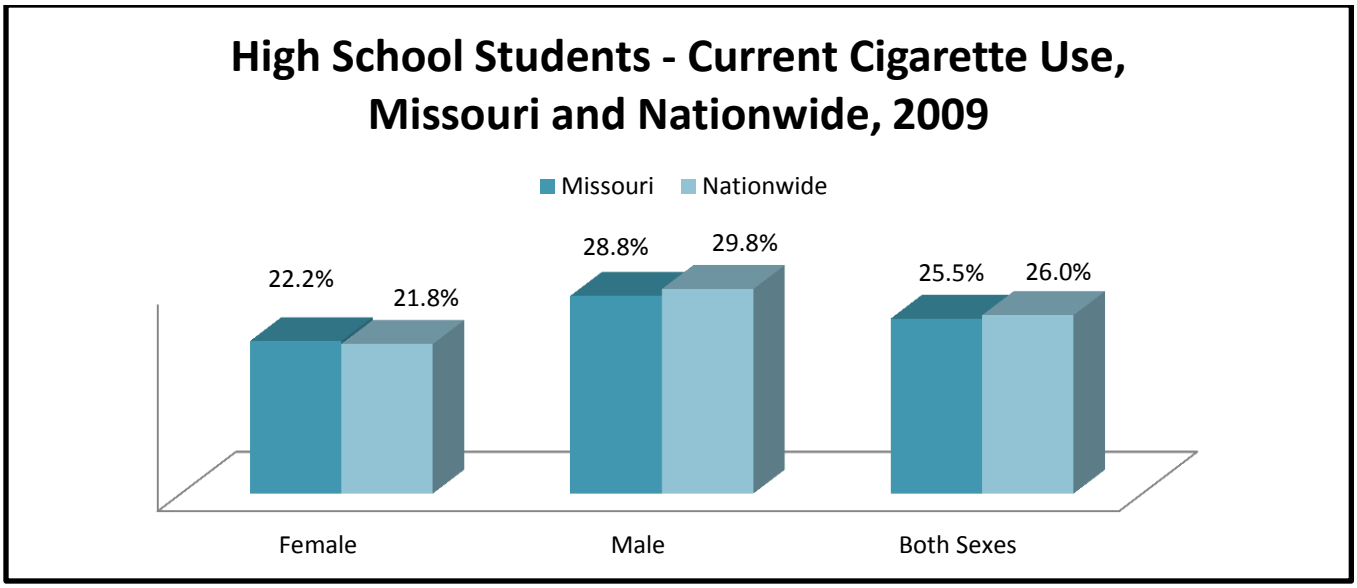
The use of cigarettes and smokeless, or chewing, tobacco is a risk factor for periodontal disease, dental caries and other oral diseases. Additionally, current smokers report poorer oral health status and more oral health problems than either former smokers or those who never smoked.[1]

Most urgently, however, tobacco use has been linked to oral lesions that can develop into cancer of the oral cavity and pharynx. Tobacco use has been estimated to account for 90% of all oral cancers and has been identified as the greatest preventable risk factor for oral cancer. Cancer of the oral cavity and pharynx are among the most deadly cancers; only about half of all individuals with oral cancer are still alive five years after diagnosis.[1]

The use of tobacco products can be examined in both young people and adults. While oral cancer is typically diagnosed in adulthood, a national study demonstrated that nearly 20% of children 12 to 17 years of age who currently used chewing tobacco had the type of oral lesion linked with tobacco use. Prevalence of this lesion increased with increasing duration and frequency of chewing tobacco use.[1]

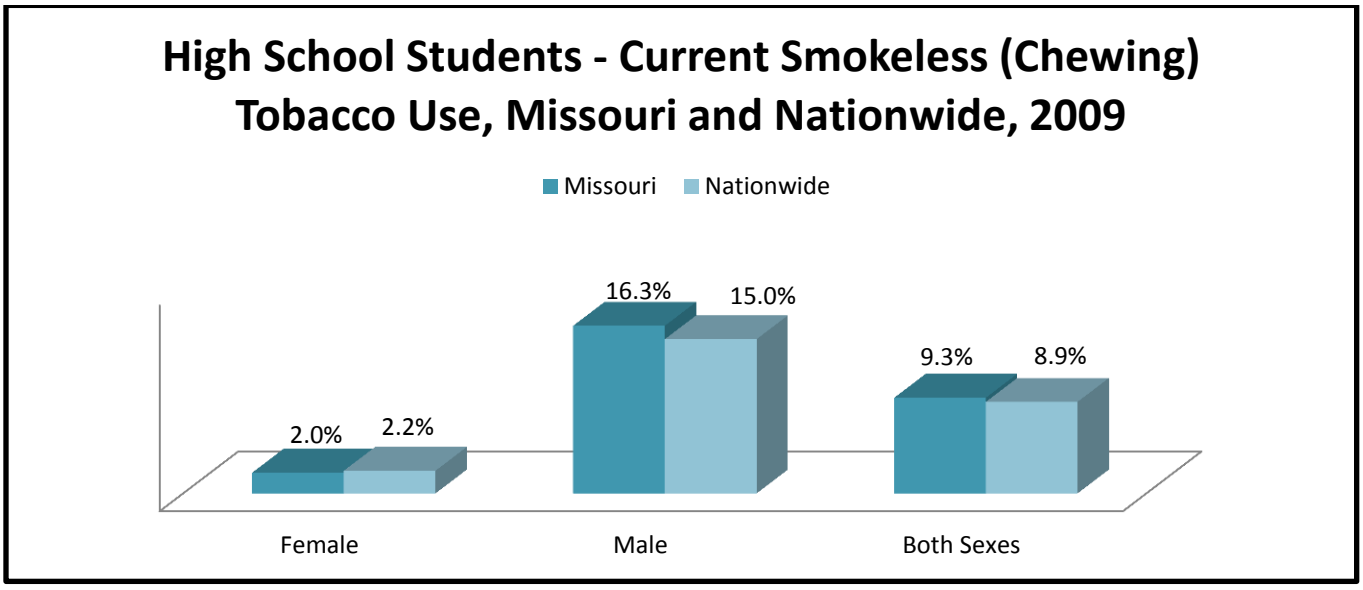
Tobacco Use - High School Students

The YRBS asked high school students about tobacco use. In both Missouri and nationwide, approximately a quarter of all students had smoked cigarettes on at least one day in the last 30 days, identified in the survey as “current cigarette users”. This percentage was higher among males than females both in Missouri and nationally.[6]



Data Source: Youth Risk Behavior Survey

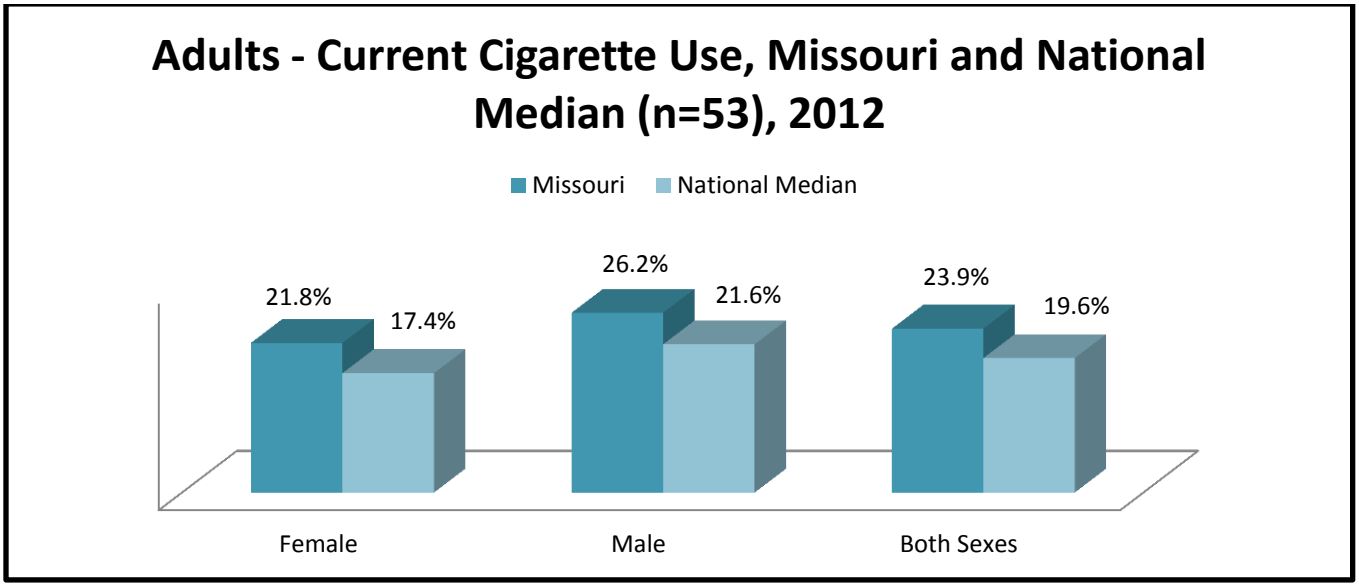
Based on the use of chewing tobacco on at least one day in the last 30 days, about 9.3% of Missouri high school students were identified as current chewing tobacco users, which is higher than the national percentage of 8.9%. The percentages were much higher among males than females (about 16% versus 2%) among Missouri high school students; this is consistent with what was observed nationally.



Data Source: Youth Risk Behavior Survey

Tobacco Use - Adults

According to the 2012 BRFSS, about 24% of Missouri adults currently use cigarettes, which is slightly higher than was observed nationally (about 20%). In both Missouri and nationwide, a greater percentage of males currently smoke than females.[5] All BRFSS rates reported in this section are age-adjusted.



Data Source: National BRFSS Site

Cigarette use is most prevalent among whites and individuals of other racial groups than among African Americans or Hispanics.

Current Cigarette Use by Race and Ethnicity, Adults 18 Years and Older, Missouri – 2012	
African American	22.1%
White	24.0%
Other Races	24.8%
Hispanic	20.5%

Data Source: Missouri BRFSS Report

Among Missouri adults, about 5.3% currently use smokeless/chewing tobacco. However, use of this kind of tobacco is rare among females (<1%) so it is most useful to look at the prevalence among males, which is 10.3%.[24]

Adults - Tobacco Use Education by Dentists

Education about the link between tobacco use and cancer of the oral cavity and pharynx is important to decrease incidence of this deadly cancer. In addition to cancer risk, as mentioned earlier tobacco use is also linked to dental caries, periodontal disease, and other adverse outcomes. The 2011 County-Level Study asked a series of questions to examine whether dental professionals in particular were addressing tobacco use among their patients.

About 38.9% of adults who visited a dentist in the last year were asked by a dentist if they smoked in the last year, and this was similar among males and females. This percentage was higher among African Americans, Hispanics, and individuals of other races than among whites.[25]

Percent of Adults Asked by Dentist About Smoking Status – Missouri 2011	
Sex	
Female	38.1%
Male	39.9%
Race	
African American	52.4%
White	36.8%
Other	51.9%
Ethnicity	
Hispanic	46.5%

Data Source: County-Level Study

Overall, about 25.8% of adults who visited a dentist in the last year were asked by a dentist if they used smokeless or chewing tobacco. This was lower among females than males. African Americans, Hispanics, and other races were asked about chewing tobacco use by a dentist more frequently than whites.[25]

Percent of Adults Asked by Dentist About Using Smokeless (Chewing) Tobacco – Missouri 2011	
Sex	
Female	22.9%
Male	29.3%
Race	
African American	32.9%
White	24.6%
Other	36.4%
Ethnicity	
Hispanic	29.7%

Data Source: County-Level Study

According to the County-Level Study, about 41% of all current smokers who visited a dentist in the last year were advised by a dentist to quit smoking. This number was higher among males than females; however, there were only modest differences were observed when examined by race.[25]

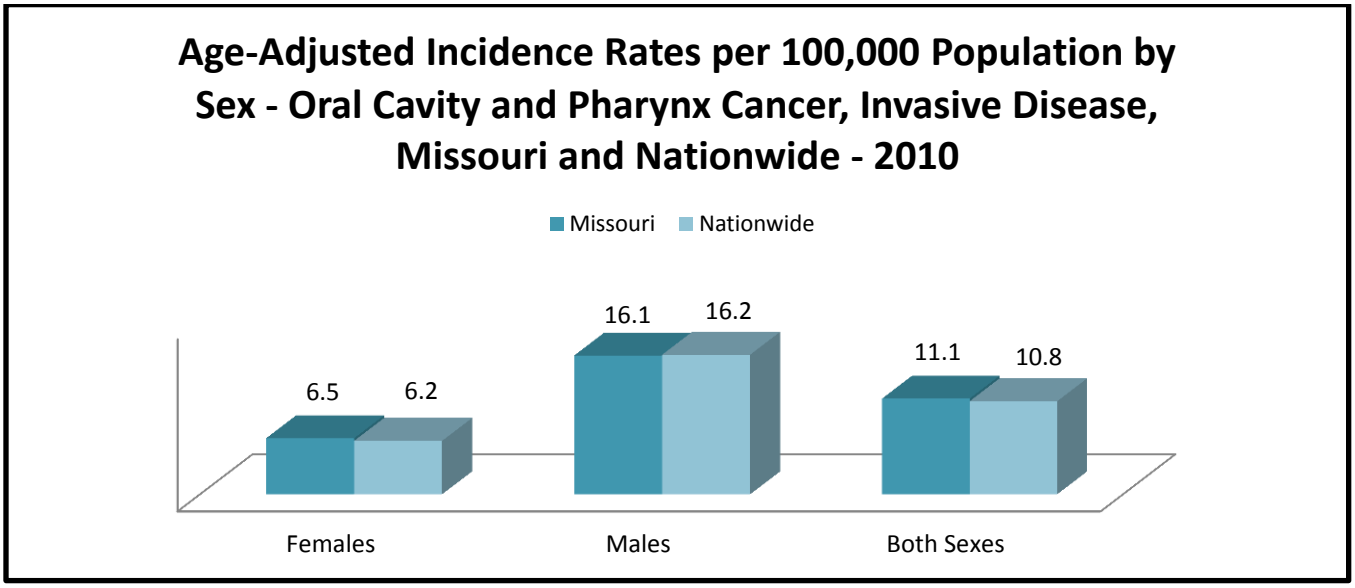
Percent of Current Smokers Advised by Dentist to Quit – Missouri 2011	
Sex	
Female	36.4%
Male	45.4%
Race	
African American	41.4%
White	40.6%
Other	38.7%

Data Source: County-Level Study

About 55% of individuals who visited a dentist and chew tobacco were advised to quit by a dentist. Due to small sample size within race categories and the low number of females that use chewing tobacco, this question was not examined further by other demographic factors.

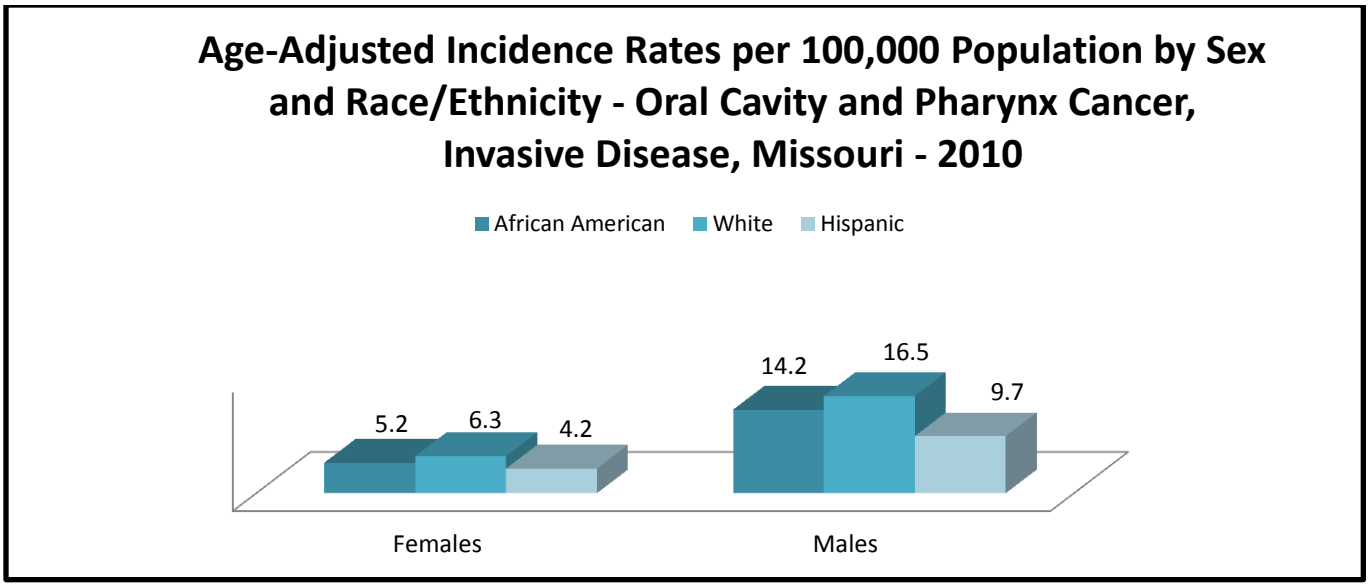
Cancer Incidence and Mortality

In 2010, 766 cases with the invasive form of oral cavity and pharynx cancer were reported among Missouri residents. 533 of these (70%) were among males. The incidence rate for 2010 was 11.1 per 100,000 for Missouri, which is slightly higher than the national rate, but this difference was not statistically significant. The rate for males was significantly higher than for females, both in Missouri and nationwide.[27] All incidence and death rates for cancer statistics are age-adjusted using the 2000 standard population and are reported per 100,000 population. When rates were examined over several years, no significant trend in terms of increasing or decreasing incidence was found.



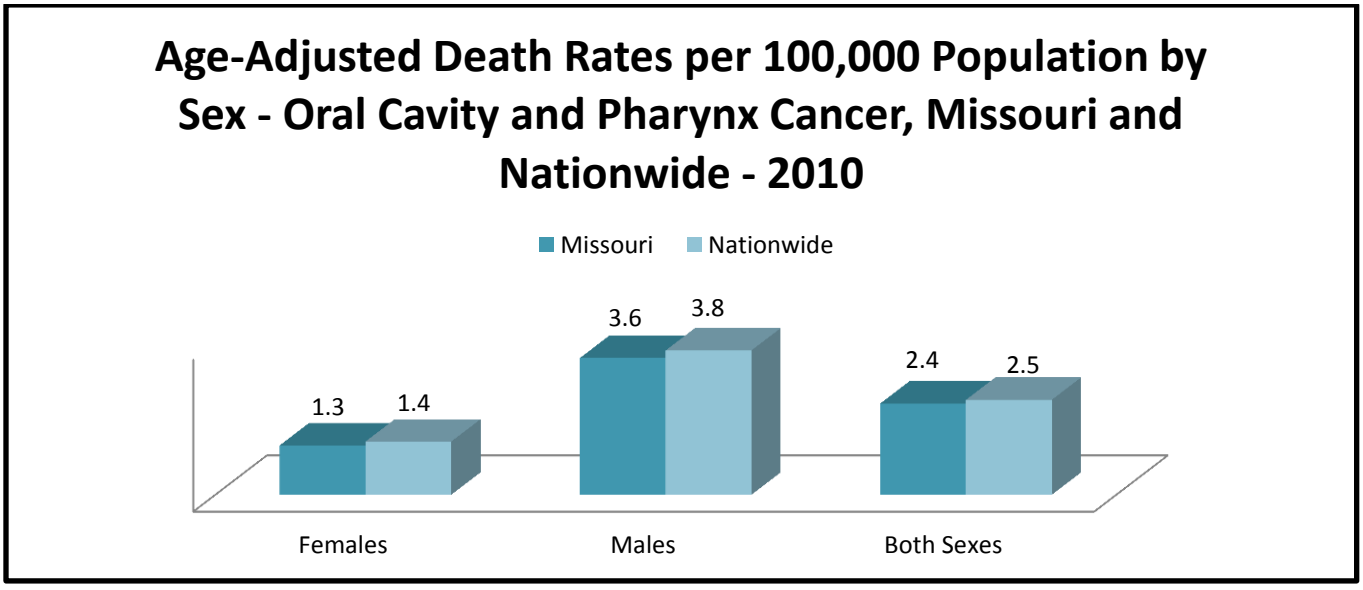
Data Source: United States Cancer Statistics

When Missouri rates are examined by race and sex, rates were higher for males in each racial and ethnic group than for females. Rates were highest among white males and females.



Data Source: United States Cancer Statistics

Death rates attributable to cancer of the oral cavity and pharynx were higher among males than females among Missouri residents and nationally.



Data Source: United States Cancer Statistics

Older Adults

Older adults in general are at increased risk of periodontal disease. They may also take prescription and over-the-counter drugs that lead to dry mouth, which increases the risk of oral disease. The Surgeon General's report Oral Health in America also states that individuals living in nursing facilities are prescribed an average of eight drugs, so this risk may be greater among this group than other older

Missourians. Influencing all of this is the fact that Medicare does not reimburse its recipients for routine dental care.[1]

In 2009, Missouri conducted an assessment of oral health among adults living independently and living in skilled nursing facilities. The assessment, carried out under the guidance of the ASTDD, involved interviews and intra-oral screenings of 1,904 adults; 1,186 were living in skilled nursing facilities (categorized for the purpose of the study as "ill") and 464 were living independently and encountered at senior community center feeding sites (categorized as "well").[27]

The table below displays basic demographics and major findings from the assessment. Fewer "ill" or skilled nursing residents had visited a dentist in the last year than "well" participants. Significant oral debris was observed in the mouths of skilled nursing residents at a higher rate than among adults living independently. More serious oral health issues were observed in the "ill" group (who were living in skilled nursing facilities) as well – greater proportion had untreated decay, severe periodontal disease, needed urgent dental care, and were missing upper and lower teeth.

Missing teeth on upper or lower jaws were observed among individuals in both "ill" and "well" groups, which were made up largely of individuals older than 60 years of age. In both groups, a greater proportion was missing upper teeth than lower teeth. No directly comparable data were available from BRFSS (that is, data on upper versus lower teeth); however, it is interesting to note that 25% of adults over 65 years of age have had all of their permanent teeth extracted.

The dental assessment in older adults found that individuals living in skilled nursing facilities had worse oral hygiene based on presence of oral debris in the mouth during the screening as well as more serious outcomes like periodontal disease, missing teeth, and untreated decay. This is unfortunate because individuals in skilled nursing facilities are under the care of a variety of aides and health professionals that could be addressing these problems. Additionally, only a quarter of individuals in skilled nursing had seen a dentist in the last year versus about half of all adults living independently.

Demographics and Major Findings - Adult Oral Health Assessment - Missouri 2009		
	Skilled Nursing Residents "Ill"	Living Independently "Well"
Sex		
Female	73%	64%
Male	27%	35%
Age Group		
60 Years and Younger	9%	5%
61 to 70 Years Old	10%	24%
71 to 80 Years Old	21%	38%
81 to 90 Years Old	43%	30%
Older than 90 Years Old	14%	3%
Unknown	3%	<1%
Race		
White	93%	94%
African American	5%	4%
Other/Unknown	2%	2%
Prevention/Oral Hygiene		
Visited a Dentist in the Last Year	24%	50%
Significant Oral Debris	77%	43%
Outcomes		
Untreated Decay	44%	20%
Severe Periodontal Disease	22%	14%
Urgent Dental Care Needed	2%	1%
Missing All Upper Teeth	56%	42%
Missing All Lower Teeth	44%	29%

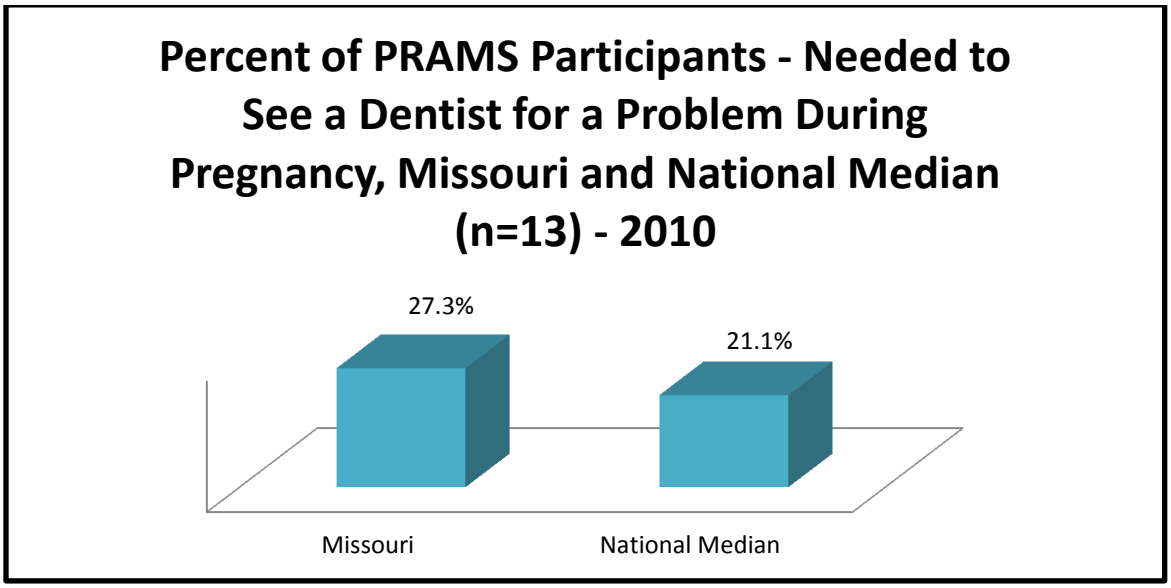
Data Source: Missouri Adult Oral Health Assessment, 2009

Perinatal Oral Health

As discussed in the Methodology section, PRAMS is a population-based surveillance system that includes the participation of the majority of states nationwide, including Missouri. PRAMS includes questions on a variety of maternal and infant health topics including prenatal care, folic acid consumption, postpartum depression, and oral health.[7]

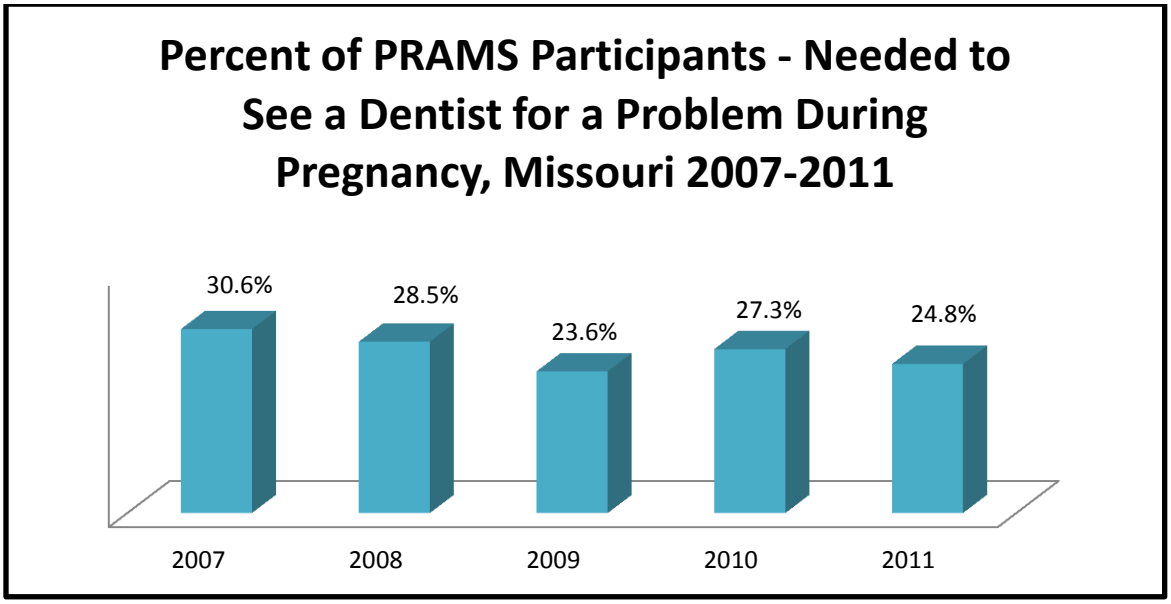
The PRAMS oral health questions are of particular interest because poor oral health during pregnancy can adversely impact both mother and child. A woman's susceptibility to oral infections like periodontal disease may result from changes that occur during pregnancy. One third of all women experience "pregnancy gingivitis" which is a mild inflammation of the gums during pregnancy. Periodontal disease during pregnancy has been linked to low birth weight in infants, preterm birth, gestational diabetes, and preeclampsia. Dental treatment is safe during pregnancy and provides an excellent opportunity to discuss good oral hygiene and nutrition.[28]

In 2010, about 27% of all Missouri women surveyed reported that they needed to see a dentist during their most recent pregnancy for a problem, which was higher than the national median, which was based on data available for 13 states that participate in PRAMS.[29]



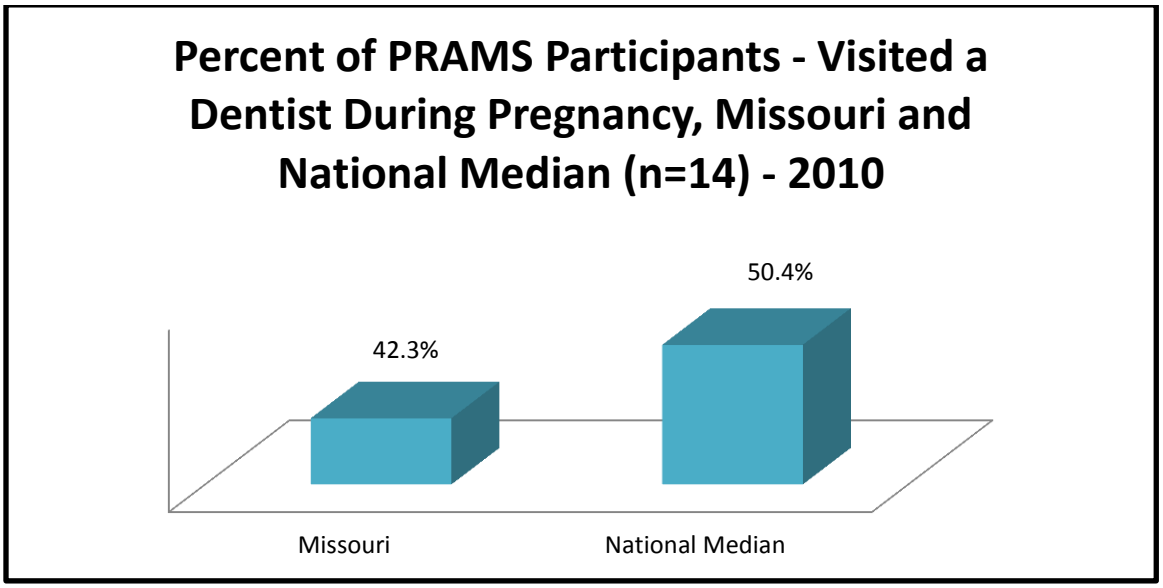
Data Source: CDC PRAMS Site

Although there has been some variability in Missouri PRAMS responses over the years, the percentage of women needing to see a dentist during pregnancy in 2011 was lower (about 25%) than in 2007 (around 30%).[30]



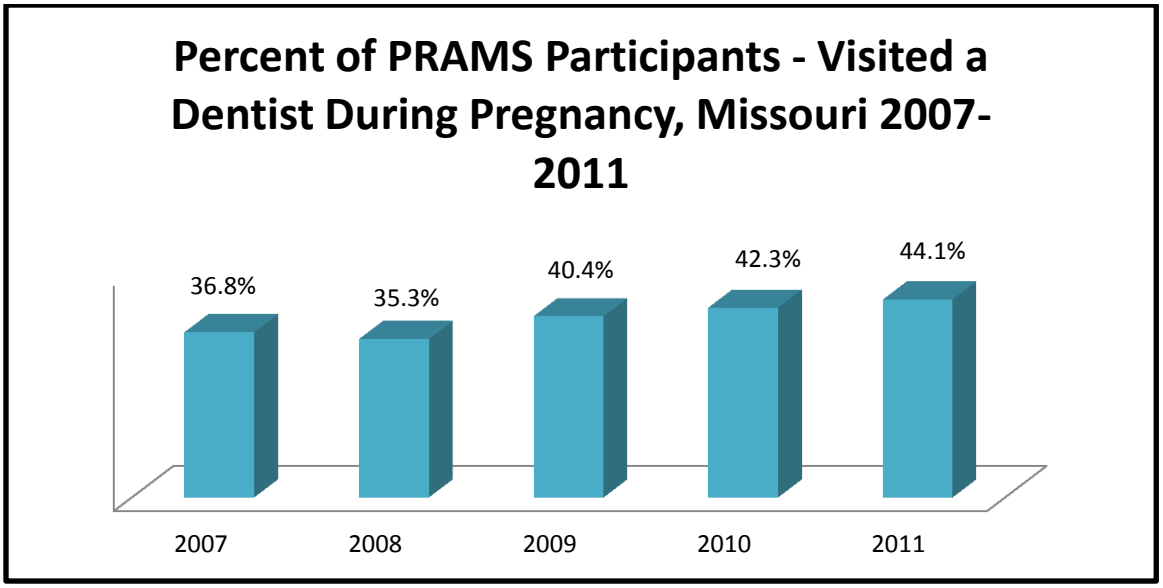
Data Source: Missouri PRAMS Program

Missouri PRAMS participants reported that they visited a dentist less frequently than was reported nationally, based on the median of 14 PRAMS states.[29] However, this number does exceed the number that reported they had a problem that required the care of a dentist.



Data Source: National PRAMS Site

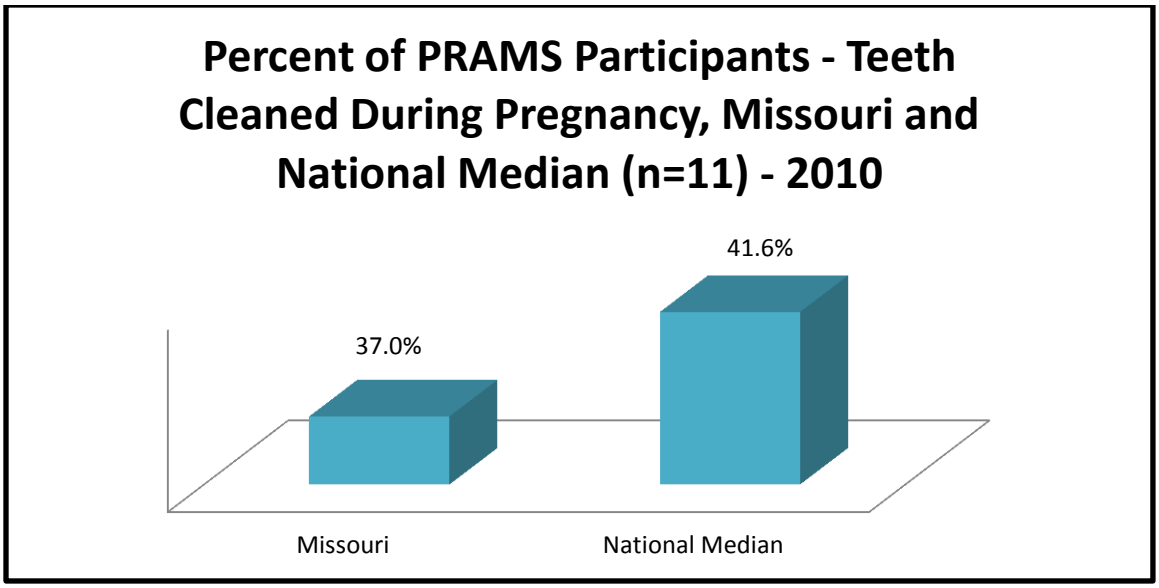
The percentage of women reporting they visited a dentist in 2011 was higher (around 44%) than was observed in 2007 (36.8%), which is an improvement for Missouri participants.[30]



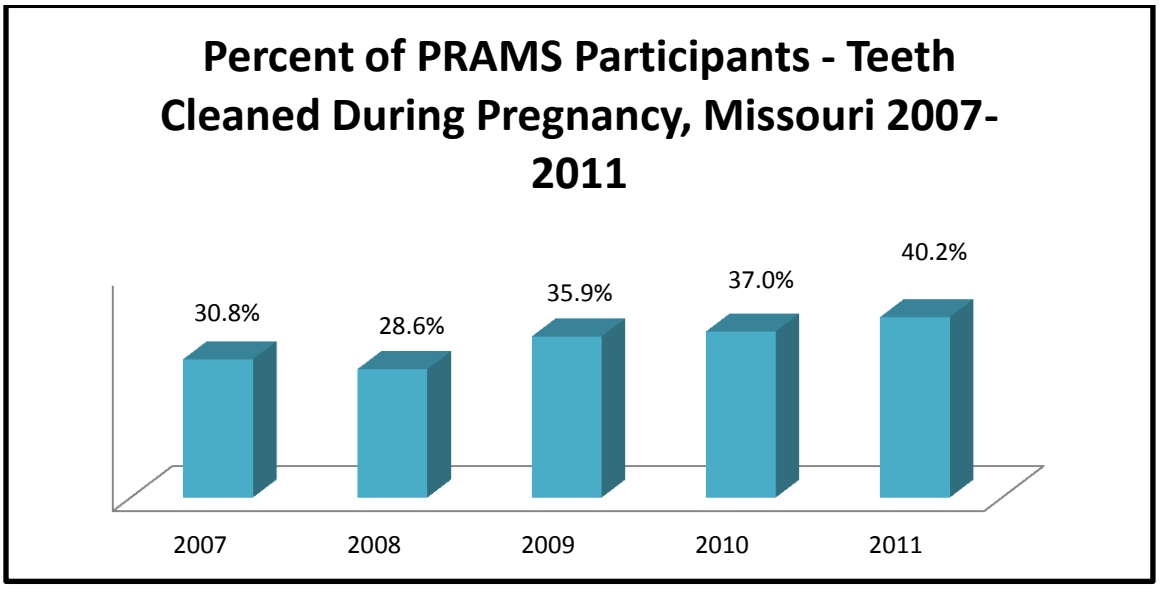
Data Source: Missouri PRAMS Program

Fewer Missouri participants (37.0%) reported having their teeth cleaned during their most recent pregnancy than was reported nationally (41.6%).[29] Although it is safe to have teeth cleaned during pregnancy, [28] a slightly lower percentage of Missouri women reported having their teeth cleaned

during their most recent pregnancy than the percentage that reported visiting a dentist during their most recent pregnancy (37.0% versus 42.3%) according to the 2010 PRAMS results. This disparity was more dramatic when national results were examined (41.6 % versus 50.4%). Also, the difference between the percentage of women who saw a dentist and those who had their teeth cleaned was larger in 2007 than in 2011.[30]



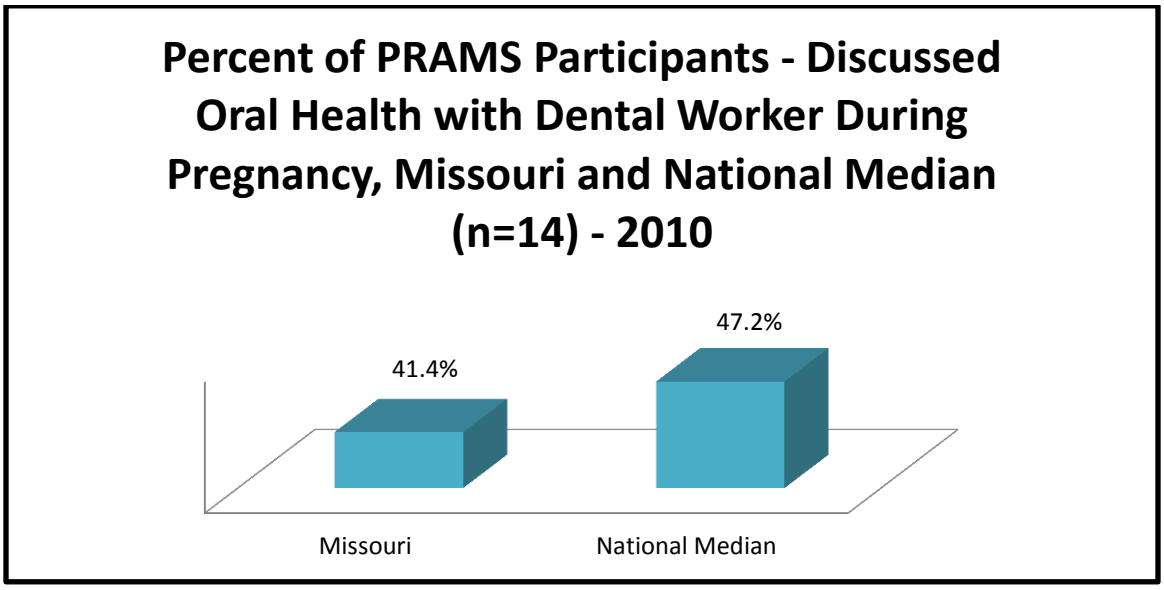
Data Source: National PRAMS Site



Data Source: Missouri PRAMS Program

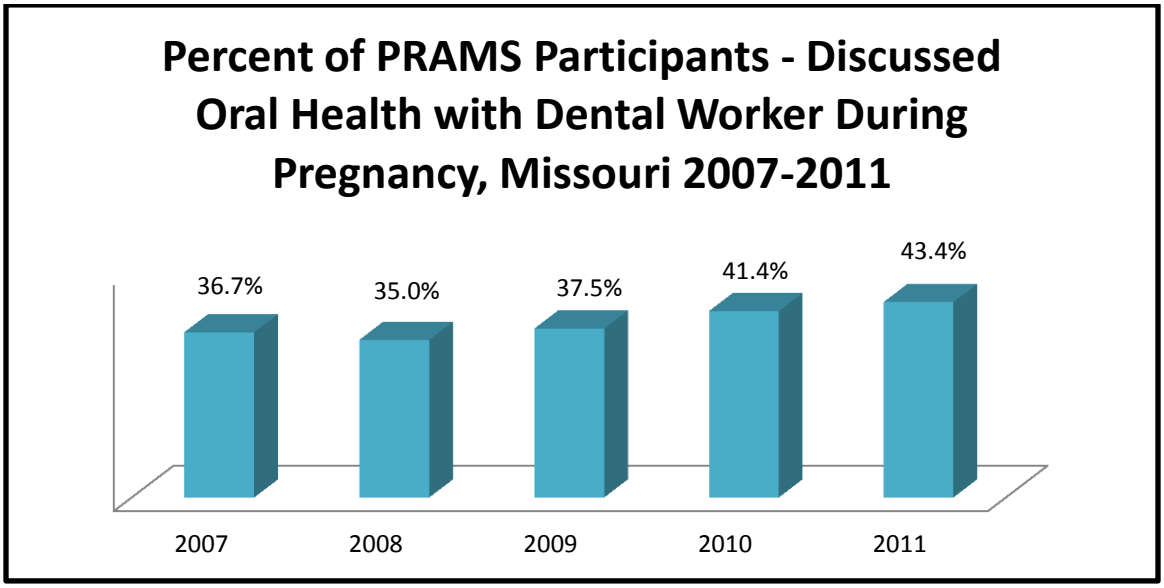
A lower percentage of Missouri participants reported that a dentist or dental worker discussed how to care for teeth and gums during their most recent pregnancy (around 41%) than was reported nationally (47%).[29] Again, when the disparity between the percentage of women who reported seeing

a dentist during their most recent pregnancy is compared to those who received oral hygiene education, the difference is less among Missouri women than what was observed nationally. [30]



Data Source: National PRAMS Site

An increase was observed in this variable over the years examined among Missouri participants.



Data Source: Missouri PRAMS Program

Hospitalizations and Emergency Department Visits

DHSS creates hospitalization and ED visit data from Patient Abstract System files and shares them via a web-query system called MICA. MICA data are age-adjusted using the 2000 standard population; data for specific age groups are crude rates. Of particular interest are the "disorders of the tooth and jaw" within the "digestive disorders" category. The International Classification of Diseases version 9 (ICD-9) codes included in the "disorders of the tooth and jaw" have been reviewed by DHSS-affiliated dentists to ensure they represent complaints that specifically exclude injuries and malignancies. Therefore, these dental ED visits can be considered preventable and non-traumatic. Additionally, these complaints could all be treated in a dental office rather than a hospital. Furthermore, EDs generally only provide short-term relief of symptoms for this class of dental problems, which means that an additional visit to a dentist will be necessary for most patients to complete their treatment.[31]

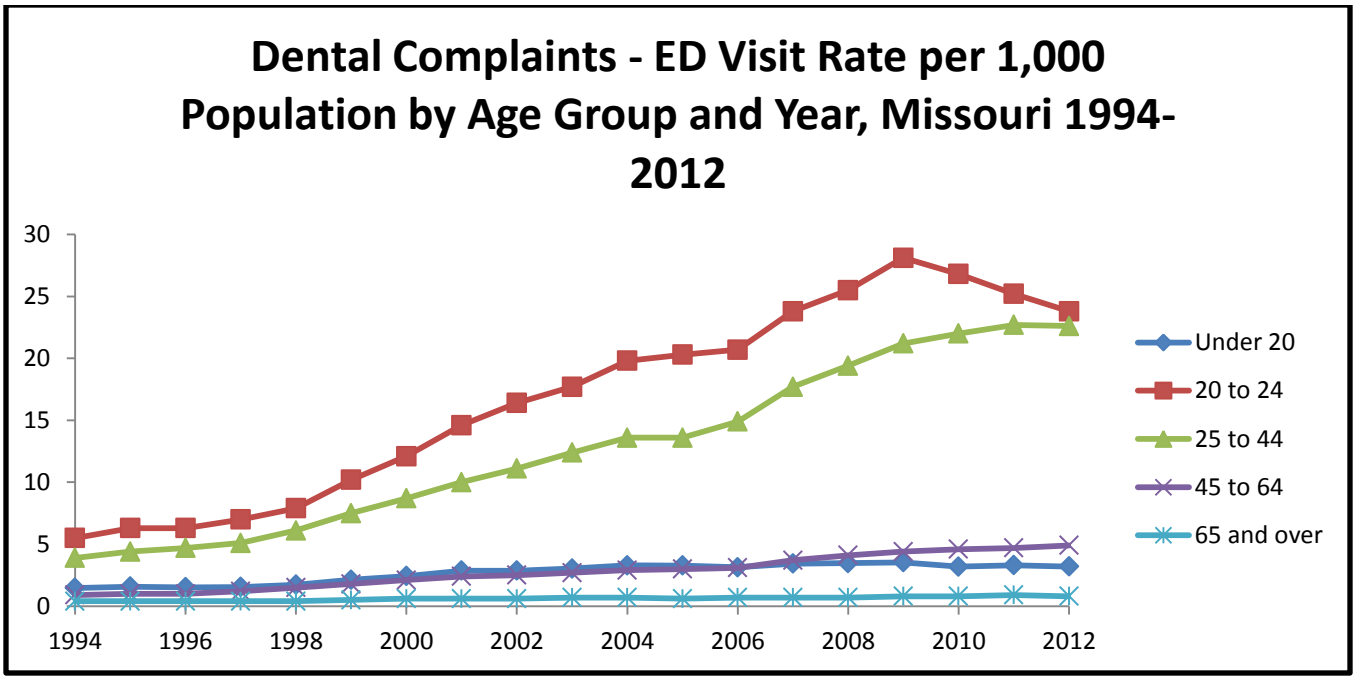
Missouri has seen an increase in dental-related ED visits in recent years, which is consistent with trends reported in several national studies as well as a study based in Kansas City, Missouri.[32] Between 1994 and 2012 in Missouri, the average annual percent change in age-adjusted ED rates was 20.5%.[33] This is higher than the rate of increase observed for ED visits in general, which was only about 1.5%. This is similar to the average annual percent change for the number of ED visits as well; the annual change for dental complaints was 21.9% and was only 2.2% for all complaints combined.

In 2012 alone, 58,309 ED visits for dental complaints were reported among Missouri residents. This represented 2.5% of all ED visits for all complaints. Based on national estimates, an ED visit for a dental complaint costs more than $300 – using this estimate, Missouri ED visit costs exceeded $17.5 million in 2012 alone.

Number and Rate* of ED Visits for Dental Complaints versus All Visits by Year, Missouri Residents 1994-2012				
	Dental Complaints		All Visits	
Year	Number	Rate per 1,000	Number	Rate per 1,000
1994	11,780	2.2	1,663,481	309.7
1995	13,321	2.4	1,674,881	309.8
1996	13,732	2.5	1,592,928	292.5
1997	15,059	2.7	1,619,243	295.2
1998	17,701	3.2	1,713,367	310.6
1999	21,934	4.0	1,823,866	328.9
2000	25,572	4.6	1,869,558	335.4
2001	29,756	5.4	1,950,481	347.9
2002	32,630	5.9	1,972,842	350.6
2003	35,869	6.5	2,032,593	359.8
2004	39,259	7.0	1,991,967	350.5
2005	39,573	7.1	2,048,068	358.1
2006	41,914	7.5	2,057,230	356.8
2007	48,987	8.7	2,177,183	375.3
2008	52,872	9.4	2,206,691	378.8
2009	57,281	10.1	2,194,143	375.9
2010	57,902	10.2	2,214,649	377.4
2011	58,714	10.3	2,274,090	387.3
2012	58,309	10.3	2,314,348	394.2

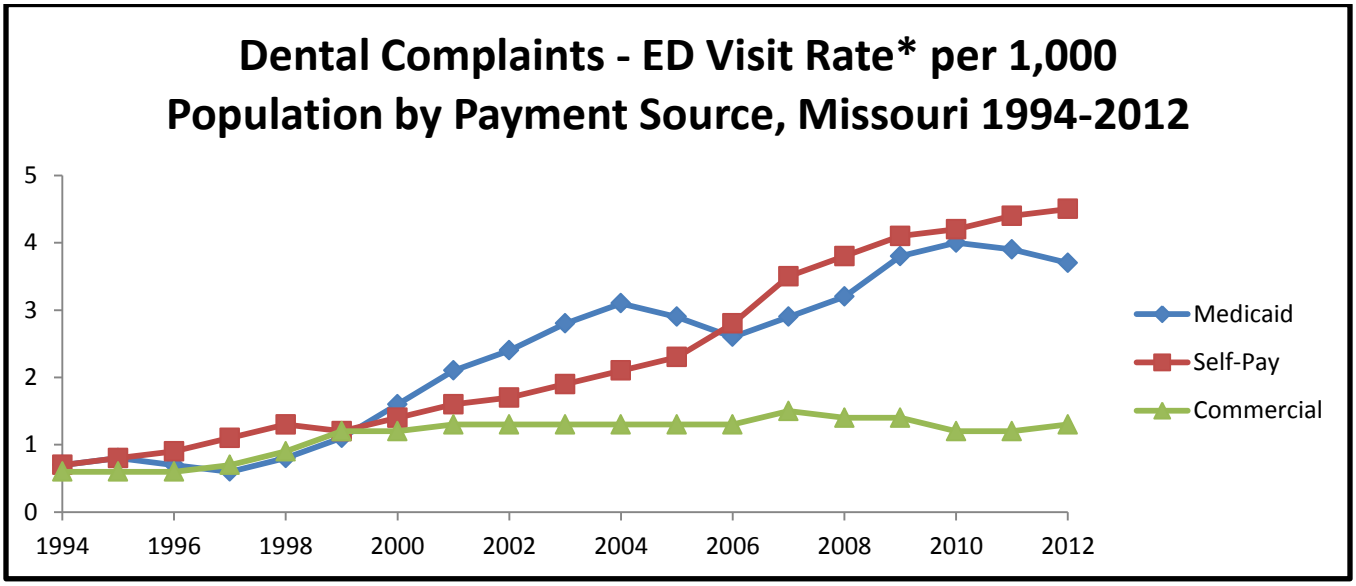
Data Source: ED MICA; *Rates are age-adjusted using the 2000 Standard Population.

When ED visit rates for dental complaints are examined by age group, it is important to note that the highest rates were observed among individuals between 20 and 44 years of age during each year examined. The lowest rates were among younger (under 20 years old) and older groups (45 years of age and older). The average annual change in number of visits between 1994 and 2012 for 20- to 24-year-olds was 22.9% and was 26.9% for 25 to 64 year-olds. The average annual change during this time for individuals younger than 20 was only 6.8% and for adults 65 and older was 8.9%.



Data Source: ED MICA

When ED visits by payment source are reviewed, rates for Medicaid and Self-Pay have increased more rapidly than for commercial insurance since 1994. Starting in 2000, the leading payment source was Medicaid (MO HealthNet) until 2006 when it was surpassed by Self-Pay. This is significant because Self-Pay is considered a proxy measure for the uninsured; these data are for the expected payment source upon discharge from the ED. Therefore, it is unclear whether patients in the Self-Pay category ultimately pay for the care they have received. The Commercial payment sources billed by hospitals are medical insurance companies rather than dental insurance providers.

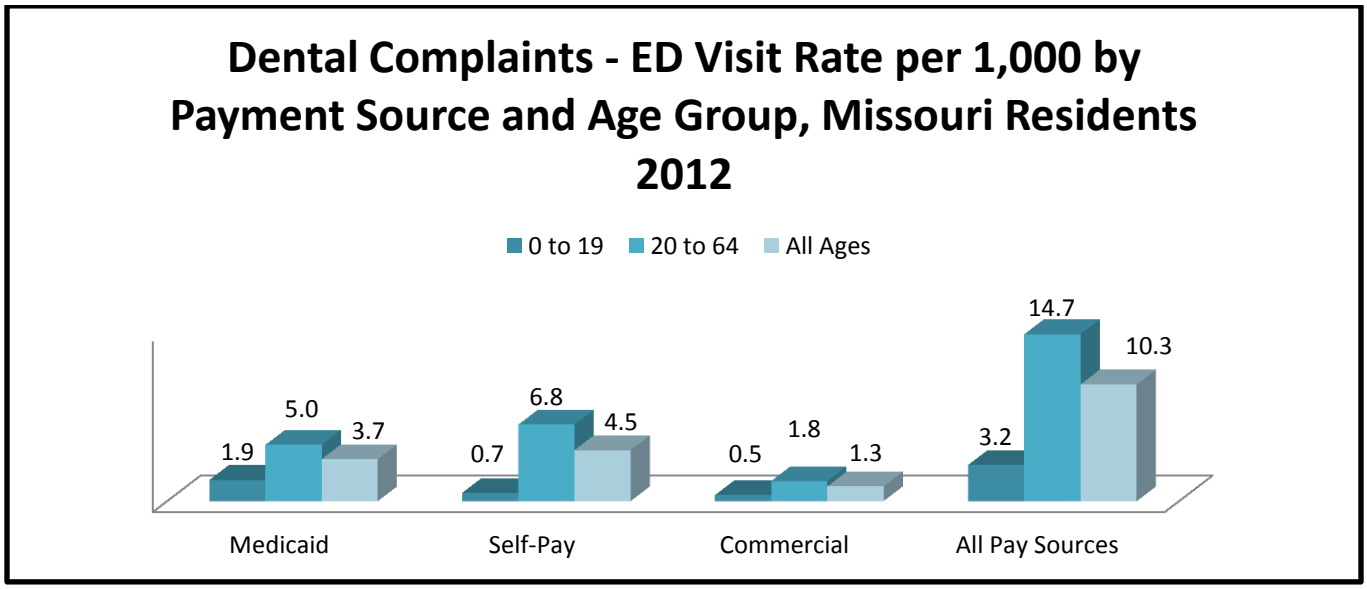


Data Source: ED MICA; *Rates are age-adjusted using the 2000 Standard Population.

In 2012, the highest dental ED visit rates were among adults 20 to 64 years of age. Among this group, Self-Pay was the most common expected payment source, followed by Medicaid. For individuals younger than 20 years of age, Medicaid was the most cited payment source. It is important to note that the majority of individuals eligible for dental benefits in Missouri's Medicaid system are younger than 20 years old.

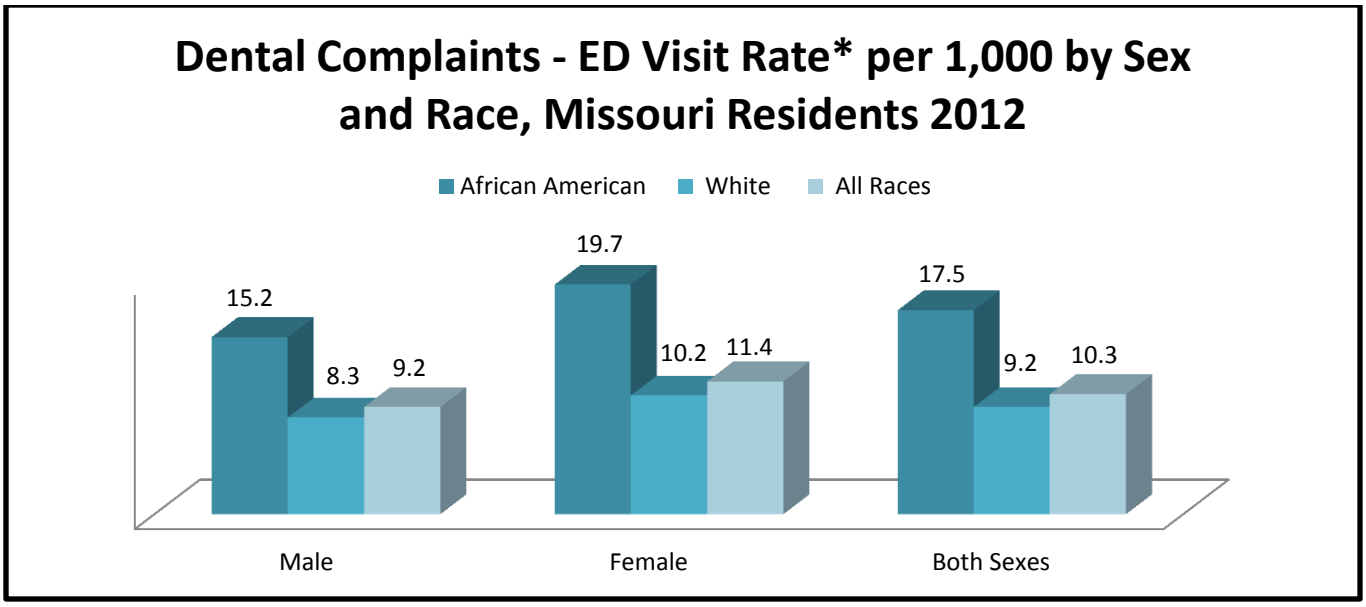
These findings are significant for many reasons. It suggests that although Missourians on Medicaid are eligible for dental benefits up to age nineteen, including dental visits to prevent and treat dental problems, the ED is still being utilized for dental complaints. Although dental coverage is not offered to adult Medicaid recipients in Missouri, patients are seeking care at hospitals for their dental needs, which is ultimately billed to Medicaid. This ED care is at a higher cost than a visit to a dentist and without resolution of the underlying problem. [31]

Similarly, the majority of ED visits for individuals over 65 years old listed an expected payment source of Medicare, at around 86% (not included on figure). Medicare does not offer reimbursement of services provided in a dental office.[1]



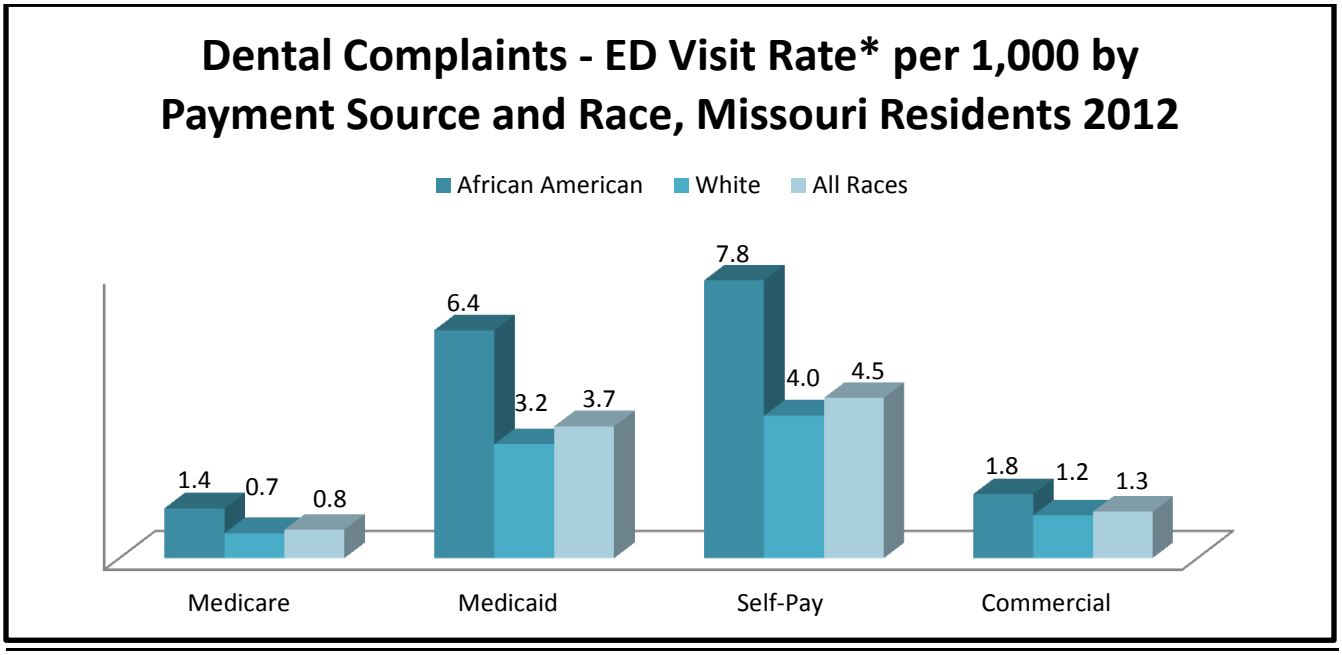
Data Source: ED MICA

When 2012 ED visit rates for dental complaints are examined by sex, females had higher rates than males. African American females had the highest rates of any group examined; African American males had higher rates than white males. In 2012, only 688 out of 58,309 ED visits were among individuals of Hispanic origin, so rates by ethnicity were not calculated.



Data Source: ED MICA; *Rates are age-adjusted using the 2000 Standard Population.

When ED visit rates for dental complaints are examined by race and payment source, higher ED visit rates were observed for African Americans in each payment category. Self-pay followed by Medicaid were the two most frequently listed payment sources among both African Americans and whites.



Data Source: ED MICA; *Rates are age-adjusted using the 2000 Standard Population.

Rarely, inpatient hospitalizations result from disorders of the tooth and jaw. In 2012, only 610 inpatient admissions for dental complaints were recorded, [34] which is much lower than the 58,309 ED visits that occurred in the same year.

Even though inpatient admissions for dental complaints are rare, they did result in 1,845 total days of care and nearly $13.5 million in total charges. It is important to note that the total charges figure reported is just for billed charges associated with the hospital stay and does not necessarily reflect the costs or final reimbursed amount.

Dental Complaints - Inpatient Hospitalization Data, Missouri Residents 2012			
Payment Source	**Number of Discharges**	**Total Days of Care**	**Total Charges**
Medicare	156	575	$ 3,830,774
Medicaid	171	526	$ 3,556,455
Self-Pay	116	259	$ 1,607,211
Commercial	151	449	$ 4,060,880
Other	16	36	$ 395,965
All Pay Sources	610	1,845	$ 13,451,285

Data Source: MICA

The dramatic increase observed with ED visits has not been observed for inpatient admissions. However, even though inpatient admissions remained relatively stable with an average annual percent change of 1.3%, charges associated with dental admissions have increased more dramatically, by an average of 10.8% each year.

Dental Complaints - Inpatient Visit Rate* per 10,000 by Year, Missouri Residents 1994-2012			
Year	**Rate**	**Number of Discharges**	**Charges**
1994	0.9	494	$4,567,967
1995	0.9	477	$4,997,663
1996	0.7	391	$3,847,833
1997	0.7	357	$3,368,981
1998	0.6	344	$3,396,184
1999	0.7	373	$3,540,390
2000	0.7	417	$4,786,962
2001	0.9	506	$4,950,980
2002	0.7	420	$4,256,003
2003	0.8	458	$5,156,077
2004	0.8	470	$5,817,062
2005	0.8	488	$6,147,743
2006	0.8	462	$6,463,825
2007	0.9	524	$7,637,540
2008	0.9	513	$8,803,454
2009	0.9	530	$9,730,369
2010	1.0	603	$13,331,556
2011	0.9	548	$12,223,378
2012	1.0	610	$13,451,285

Data Source: MICA; *Rates are age-adjusted using the 2000 Standard Population.

Access to Care

Dental Health Professionals

Dental professionals include dentists, registered dental hygienists, and dental assistants. The Missouri Dental Board requires each dentist and hygienist to obtain a license in order to practice in Missouri, which allows for the oral health workforce to be assessed. It is important to note that workforce data do not take into consideration the number of hours worked per week, productivity, or particular oral health burden of each population; rather, the numbers are reported as a baseline to understand broad workforce needs in Missouri.

Dentists may work within many specialties including general dentistry, pediatric dentistry, and orthodontics. According to data compiled in early 2014, there were 3,274 dentists licensed by the Missouri Dental Board who reported a Missouri address. Missouri has 1 dentist per 1,846 residents. According to definitions used by the DHSS State Office of Rural Health, the dentist-to-population ratio in urban areas was 1 per 1,503 which is in sharp contrast to the ratio in rural areas (1 per 2,969 residents). There are no dental licensees in five Missouri counties, all of which are rural. [35]

Dental hygienists work alongside dentists to provide preventive dental care, perform dental cleanings, and examine patients for signs of oral disease. According to data compiled in early 2014, there were

2,837 dental hygienists licensed by the Missouri Dental Board who reported a Missouri address. Assuming a rate of 1 full time equivalent per hygienist, Missouri has 1 hygienist per 2,130 residents. The hygienist-to-population ratio in urban areas was 1 per 1,770 residents and 1 per 2,130 residents in rural areas. Additionally, there were no hygienist licensees reporting addresses in eleven Missouri counties, all rural. [36]

Federally Qualified Health Centers (FQHC) are health centers supported by the Health Resources and Services Administration (HRSA) that are community-based, located in defined high need communities and focused on serving populations with limited access to health care.[37] Currently there are 236 health center facilities in Missouri that are operated by 28 grantees.[38] These grantees are required to provide oral health services, though not in each facility that they operate.

The most recent Missouri health center data compiled by HRSA are for services rendered in 2012 among 23 FQHC grantees. These health centers provided services to 438,406 patients, of which 264,135 (74.8%) were below the FPL, 152,050 had no insurance (34.7%) and 185,984 were on Medicaid (42.4%).[39] In 2012 FQHCs employed a total of 120.2 FTE dentists who provided 292,371 clinic visits. The FQHCs provided emergency dental services to 5,182 patients, oral exams to 134,770 patients, prophylaxis to 88,839 patients, sealants to 13,321 patients, and oral surgery to 38,697 patients. Because these data were collected when there were only 23 FQHC grantees, these numbers can be expected to increase significantly when analyzed on the current 28 grantees.

According to HRSA, 99 Missouri counties plus areas within the City of Saint Louis and Jackson County have been designed as Dental Health Professional Shortage Areas (DHPSA).[40] A DHPSA represents an area that lacks access to dental care due to excessive distance, overutilization of available providers, or other barriers to dental care. Please see Appendix 2 for a map of Missouri DHPSAs.

There are 1,528,592 Missourians (roughly 26% of the total population) within DHPSAs. Based on the dentist-to-population ratio in these DHPSAs, a total of 286 dentists are needed to meet the needs of these residents and remove the DHPSA designations. Of those individuals residing within DHPSAs it is estimated that only 24.5% are currently having their needs met in regards to oral health services. This means there are approximately 1,154,087 Missourians who cannot routinely access dental services.

Comparing Missouri to the rest of the United States shows that Missouri is 3rd in the order of states with the most geographic and population-based DHPSAs and is 10th in terms of percentage of total population residing in a DHPSA. Missouri is also the 4th lowest state in terms of percentage of the population in DHPSAs with met needs in regards to oral health services. These indicators signify that Missouri is severely behind other states in regards to access to dental services.

Dental Coverage

Information on the number of Missourians with dental coverage is difficult to ascertain. The Surgeon General's Report states that for every adult 18 years of age and older without health insurance coverage, there are three without dental coverage.[1] According to the 2012 BRFSS, about 17.5% of Missouri adults report that they do not have any health coverage at all. This is approximately 800,000 Missouri adults without health coverage. Based on the Surgeon General's estimate, approximately 2.4

million Missouri adults (about 53% of the adult population) do not have dental coverage. This is only an estimate, however, and should be interpreted with caution.

Percent of Adults - Type of Health (Excluding Dental) Coverage, Missouri 2012	
Medicare	18.7%
Medicaid	6.1%
Commercial Insurance	69.4%
None	17.5%

Data Source: Missouri BRFSS Report

As noted on page 15, parents/guardians of BSS participants were surveyed in 2005 about their children's dental coverage and dental visits. Parents reported that 76.7% of third and sixth grade children had dental insurance while 23.3% had no dental coverage. Among those that had dental coverage, private dental insurance was the most commonly cited coverage type at about 53%, followed by Medicaid at around 40%.[2] Although these figures are only for third and sixth grade participants in the 2005 BSS, it is the best information we have on dental coverage for children.

Missouri's Medicaid agency is the MO HealthNet Division within the Missouri Department of Social Services. The majority of Medicaid recipients who are eligible for dental benefits are individuals under 21 years of age, however, pregnant women, individuals who are blind, and nursing home residents are also eligible. According to the Medical Statistical Information System used by MO HealthNet, during State Fiscal Year 2013 (SFY13) there were 650,138 children enrolled in Medicaid for at least one month of the year. Also during SFY 13, there were 477 billing dentists with at least one paid claim; about 300 of these had paid claims of at least $10,000 and/or saw 100 or more beneficiaries under the age of 21.[41]

MO HealthNet Billing/Treating Dentists – State Fiscal Year 2013	
Billing Dentists with at Least One Paid Claim	477
Billing Dentists with Paid Claims of at Least $10,000	293
Billing Dentists Who Saw 100 or More Beneficiaries Under the Age of 21	308
Performing, Rendering, or Treating Dentists with at Least One Paid Claim	773

Data Source: MO HealthNet Division, Medical Statistical Information System

According to MO HealthNet, in SFY 12 the utilization rates for preventive and treatment services were higher among those on Managed Care than Fee-for-Service beneficiaries.[41]

MO HealthNet Utilization Rates for Dental Services – State Fiscal Year 2012		
	Fee-for-Service	**Managed Care**
Preventive Dental Services	39.5%	46.4%
Treatment Services	20.1%	21.9%

Data Source: MO HealthNet Division, Medical Statistical Information System

Regional and Local Data

Communities that are addressing oral health often need data at the most local level possible for grant applications, needs assessments, and the development of initiatives and interventions. Several appendices contain local and regional data that can be used for this purpose; however, the MOHP is available at OralHealth@health.mo.gov to provide technical assistance.

- Appendix 1: Map of Local Fluoride Levels, Missouri 2011.
- Appendix 2: Health Professional Shortage Areas, Missouri 2014.
- Appendix 3: Emergency department visits by county of residence for Missourians in 2012 from MICA.
- Appendix 4: Percentage of Adults 18 Years and Older – Visited a Dentist in the Last Year by County from the 2011 County-Level Study.
- Appendix 5: Percentage of Adults 18 Years and Older – Visited a Dentist in the Last Year by BRFSS Region from the 2012 Missouri BRFSS.
- Appendix 6: Percentage of Adults 65 Years and Older – All Permanent Teeth Removed due to Tooth Decay or Gum Disease by BRFSS Region from the 2012 Missouri BRFSS.
- Appendix 7: FQHC Dental Service Delivery Sites, 2014.

Conclusions

The purpose of Oral Health in Missouri 2014 was to review existing data and determine what the MOHP needs to address next in terms of surveillance, intervention development, and program planning. Additionally, this report is intended to inform the public, communities, and decision makers about Missouri's current oral health status and present recommendations for action.

Next Steps

An updated Missouri Oral Health Plan is currently in development with the assistance of oral health stakeholders representing many different disciplines and geographic areas within Missouri. Key findings from this report have been shared with state plan task force to provide context and direction during the planning process.

The MOHP has also planned to complete other oral health surveillance activities, including updating Oral Health in Missouri annually, developing fact sheets on special topics, a surveillance plan, and creating the Missouri Oral Health Surveillance System. A new BSS is planned for the upcoming 2014-2015 school year in order to gather more up-to-date population-based data on the oral health of Missouri's children. This will include a survey of parents and guardians to assess oral health practices in the home, dental coverage, and frequency of dental visits.

In the process of creating Oral Health in Missouri, the MOHP determined that there is a need to assess the risk and prevalence of periodontal disease and to gather information on dental coverage in Missouri. The state planning process and development of this report also informed the MOHP that more local and regional data should be sought to assist partners and communities in addressing oral health topics.

Recommendations

- Many communities are facing economic and other pressures which affect their ability to begin or maintain CWF. This will impact Missouri's ability to retain or improve its current CWF status, which is better than the national average, so increased educational and other resources on CWF are recommended.
- Missouri's dental sealant prevalence is lower than the national median, therefore programs should aim to increase the placement of sealants among children on newly erupted permanent molar teeth.
- Based on PSP findings, Hispanic children appear to have the most serious adverse oral health outcomes of all racial and ethnic groups examined. The Spanish speaking population should be kept in mind when culturally competent and linguistically appropriate educational materials for parents and children are developed.
- All Missourians should receive more education about oral health and the importance of regular dental visits, but this is especially important for those of lower socioeconomic groups and individuals with chronic disease.
- Dentists, dental hygienists, and medical providers should be educated about:
    - Oral cancer incidence, mortality, and risk factors.
    - The need for good oral health among individuals with chronic disease, especially diabetes.
    - Consequences of poor oral hygiene for individuals in skilled nursing facilities as well as for older adults in general.
    - The importance of maintaining oral health during pregnancy and that it is safe to have teeth cleaned during any stage of pregnancy.
- Dentists, dental hygienists, and medical providers should be involved in strategies to educate patients about:
    - Tobacco use and oral cancer risk.
    - The importance of good oral health and regular dental visits, especially for older adults and all Missourians with chronic illnesses.
    - How to maintain good oral hygiene during pregnancy.
- Increasing dental coverage of adults and children either through MO HealthNet or private insurance would decrease the risk of adverse oral health outcomes such as dental caries experience, need for urgent dental care (such as ED visits), and tooth loss.
- Improvements to the number and distribution of dental professionals, especially those that serve low income populations, are recommended in order to improve oral health outcomes and reduce the use of hospitals for non-traumatic dental complaints.

National Oral Health Surveillance System

This table summarizes the most recent statistics for each measure contained within the National Oral Health Surveillance System and relevant Healthy People 2020 objectives. This may be used as a high-level view of Missouri's current status as well as a guideline for the establishment of goals seeking to improve oral health in Missouri.

National Oral Health Surveillance System Components with Missouri and National Statistics and Healthy People 2020 Objectives

Indicator	Missouri	National	National Measure	Year	HP 2020 Objective
Percentage of Adults Who Have Visited a Dentist in the Last Year	61.8%	67.2%	Median, n=53	2012	N/A
Percentage of Adults Who Have Had Teeth Cleaned in the Last Year	61.7%	69.0%	Median, n=53	2008	N/A
Complete Tooth Loss Among Adults 65 and Older	65 and Older: 24.9% (65 to 74 year-olds: 23.9%)	65 and Older: 16.1%	Median, n=53	2012	65 to 74 year-olds: 21.6%
Loss of 6 or more Teeth Among Adults 65 and Older	53.5%	43.1%	Median, n=53	2012	N/A
Percent Served by Community Water Systems that Receive Fluoridated Water	76.4%	74.6%	National percentage	2012	79.6%
Caries Experience Among Third Grade Students	54.7%	55.4%	Median, n=43	2005	6 to 9 year-olds: 49%
Untreated Tooth Decay Among Third Grade Students	27.0%	26.1%	Median, n=43	2005	6 to 9 year-olds: 25.9%
Dental Sealants Among Third Grade Students	28.6%	37.8%	Median, n=43	2005	6 to 9 year-olds: 28.1%
Cancer of the Oral Cavity and Pharynx Incidence	11.1 per 100,000 population	10.8 per 100,000 population	Age-adjusted incidence rate	2010	N/A

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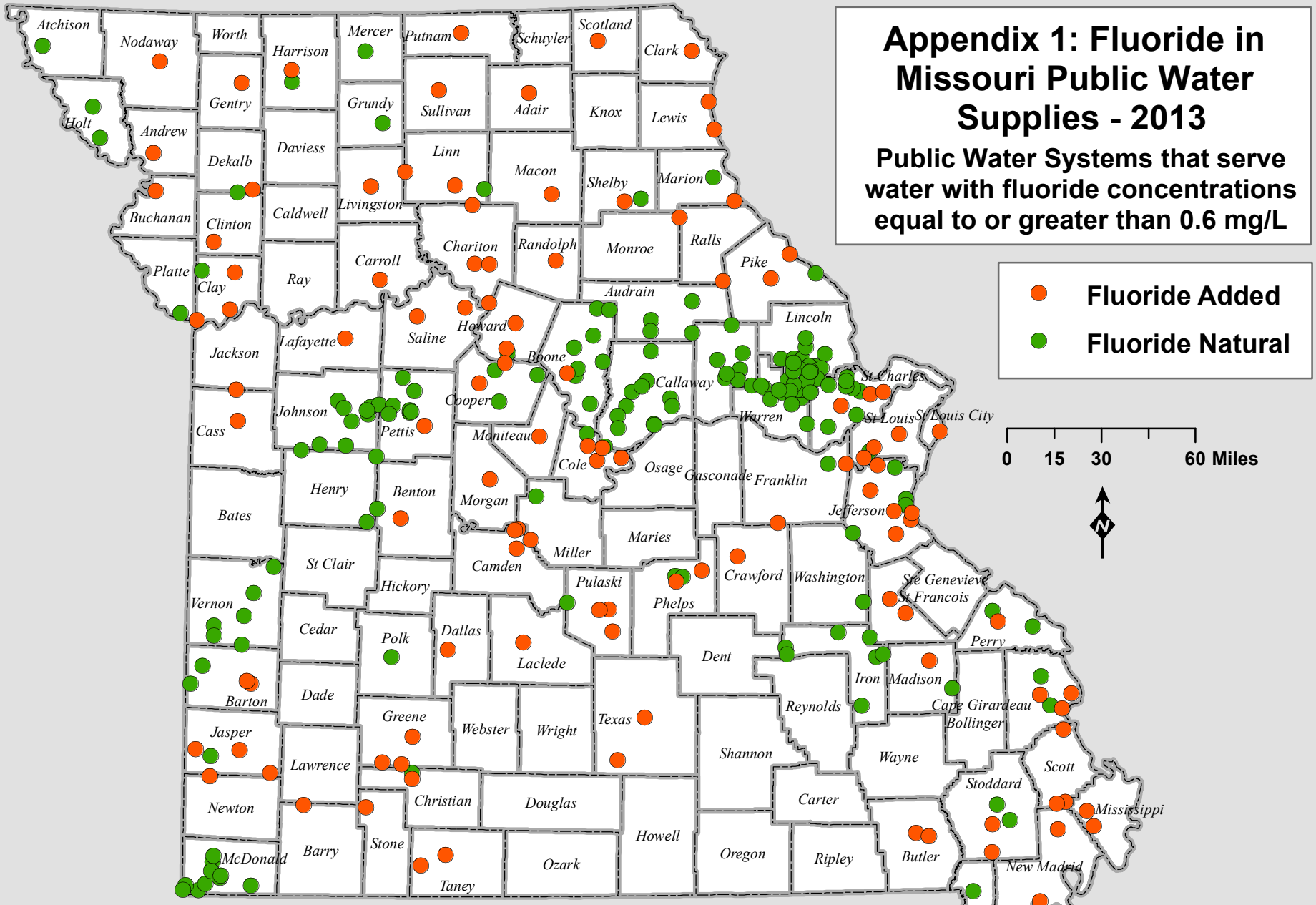
38. Health Resources and Services Administration. Health Care Service Delivery and Look-Alike Sites Data Download. Retrieved on June 19, 2014 from: http://datawarehouse.hrsa.gov/data/dataDownload/hccDownload.aspx.
39. Health Resources and Services Administration. 2012 Health Center Data. Retrieved on June 19, 2014 from: http://bphc.hrsa.gov/uds/datacenter.aspx?year=2012&state=MO.
40. Health Resources and Services Administration. Shortage Designations Page. Retrieved on June 10, 2014 from: http://www.hrsa.gov/shortage/.
41. Missouri Department of Social Services, MO HealthNet Division. Data provided from the Medical Statistical Information System.

Appendix 1: Fluoride in Missouri Public Water Supplies - 2013

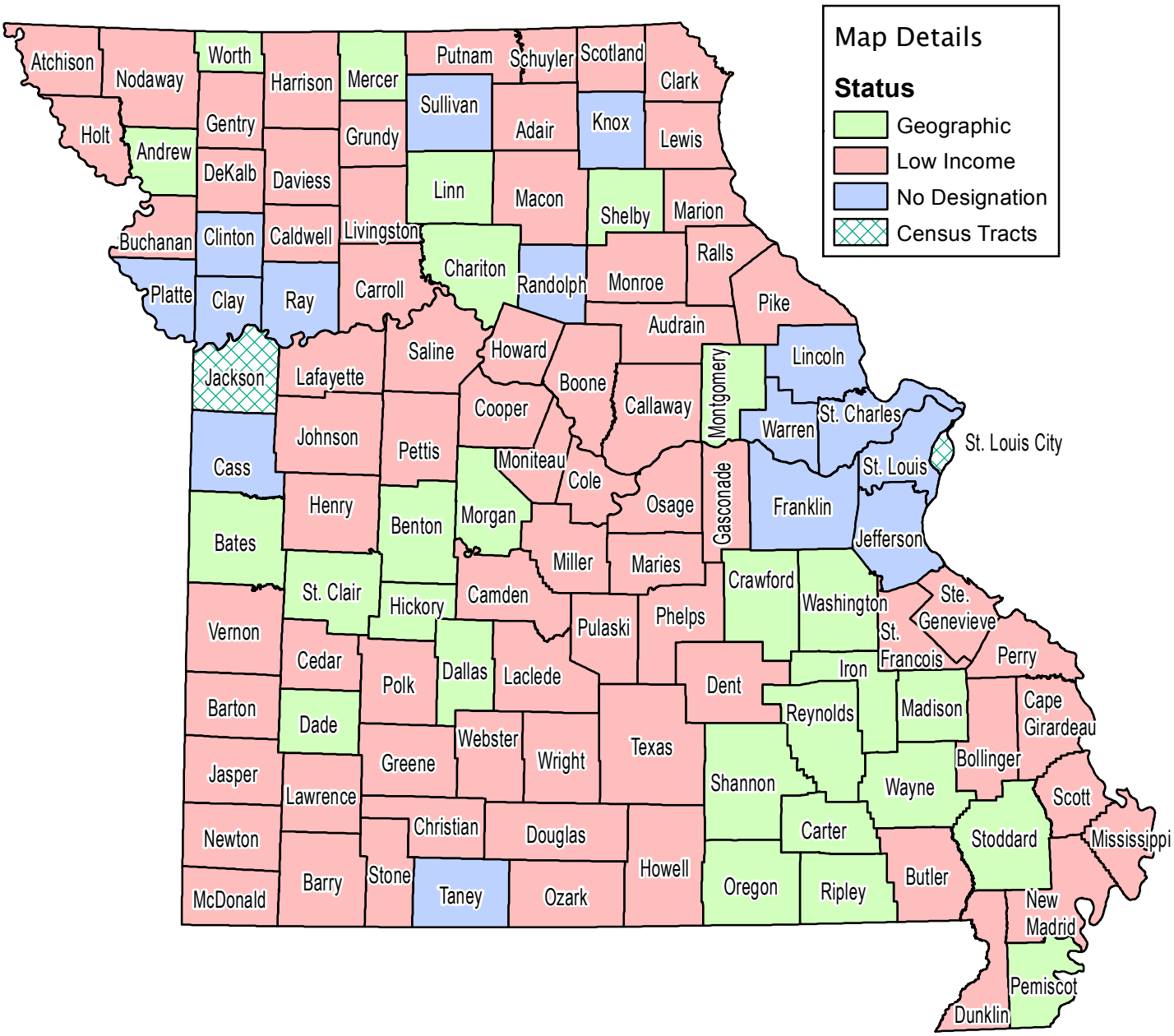
Public Water Systems that serve water with fluoride concentrations equal to or greater than 0.6 mg/L



Only primary public water systems shown. All public water systems shown here have naturally-occurring levels of fluoride in source water greater than or equal to 0.6 mg/L or chemically add fluoride to water to achieve this concentration. Data shown based on monitoring records from 2011, 2012 and 2013.

7/2014

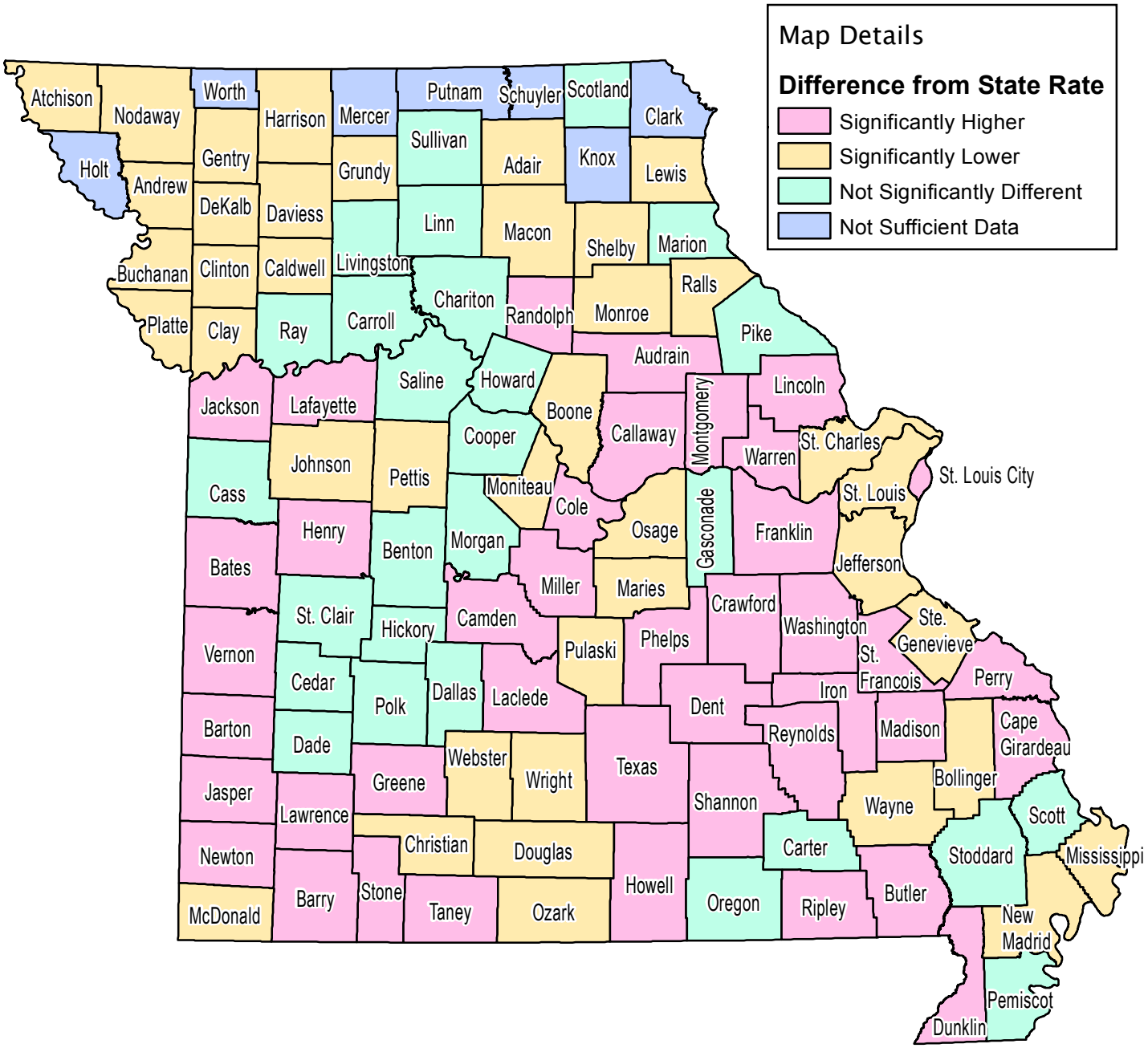
Appendix 2: Dental Care HPSA Status of Missouri Counties June 2014



Source: HRSA
Missouri Department of Health and Senior Services

Office of Primary Care and Rural Health
S. Liley
M:HPSA Status - Dental 2014
June 2014

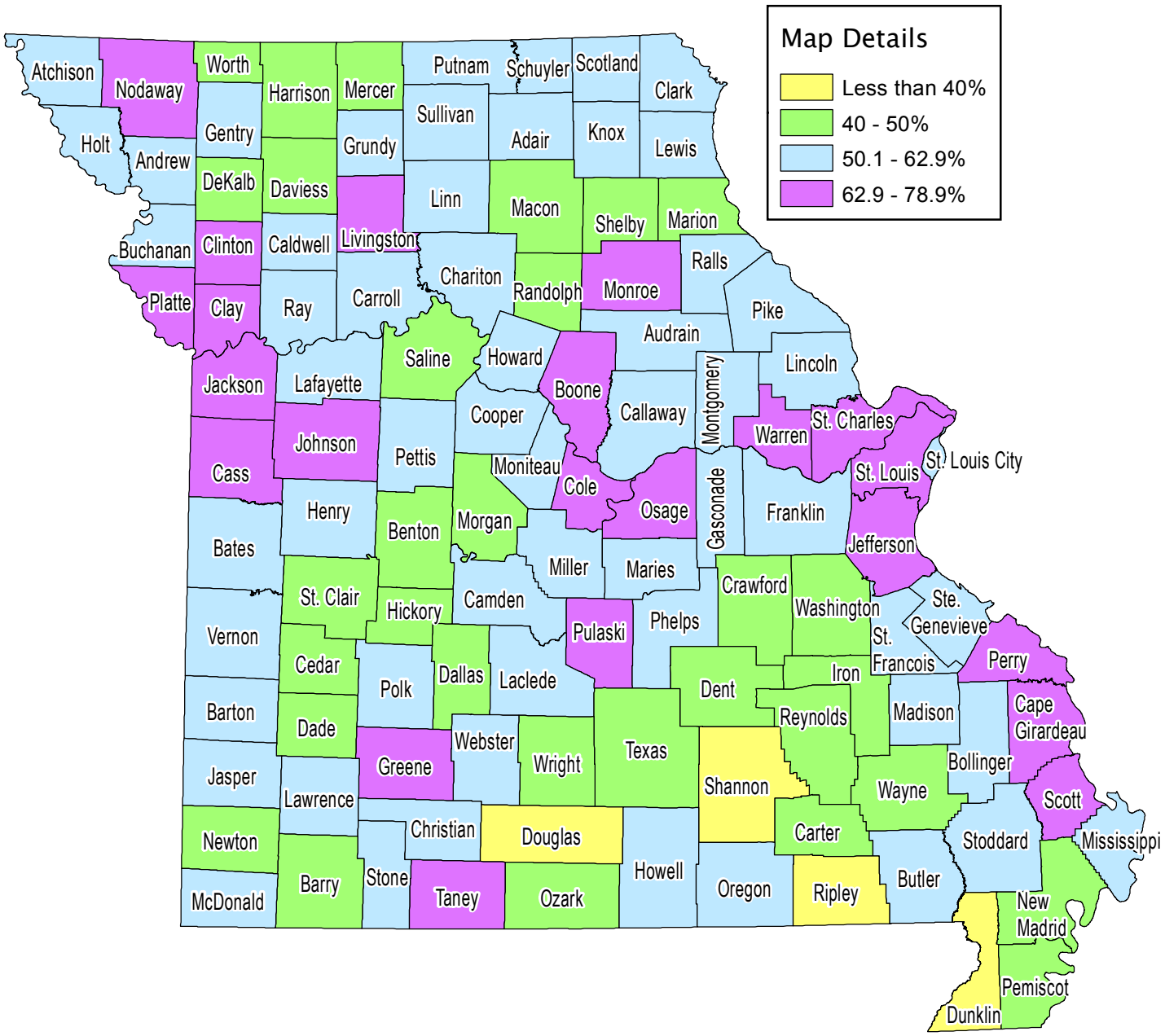
Appendix 3: Emergency Department Visit Rates for Dental Complaints by County of Residence, Missouri 2012



Source:Missouri Information for Community Assessment, health.mo.gov/MICA
Missouri Department of Health and Senior Services

Office of Primary Care and Rural Health
S. Liley
Dental ER visits 2012
June 2014

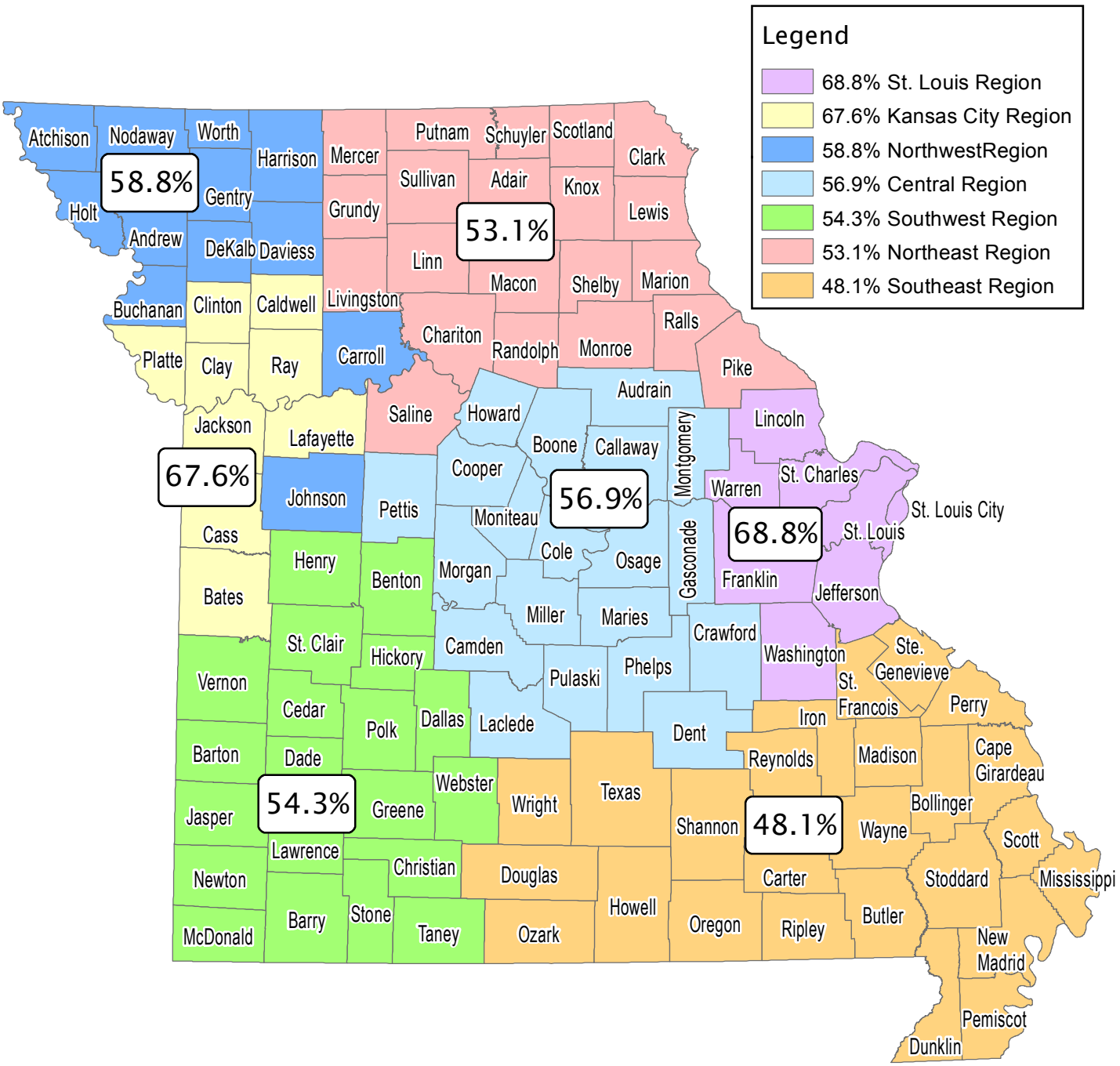
Appendix 4: Percent of Adults – Visited a Dentist in the Last Year by County Missouri 2011



Source:Missouri County Level Study, 2011
Missouri Department of Health and Senior Services

Office of Primary Care and Rural Health
S. Liley
Adults seen by Dentist 2011 Data
March 2014

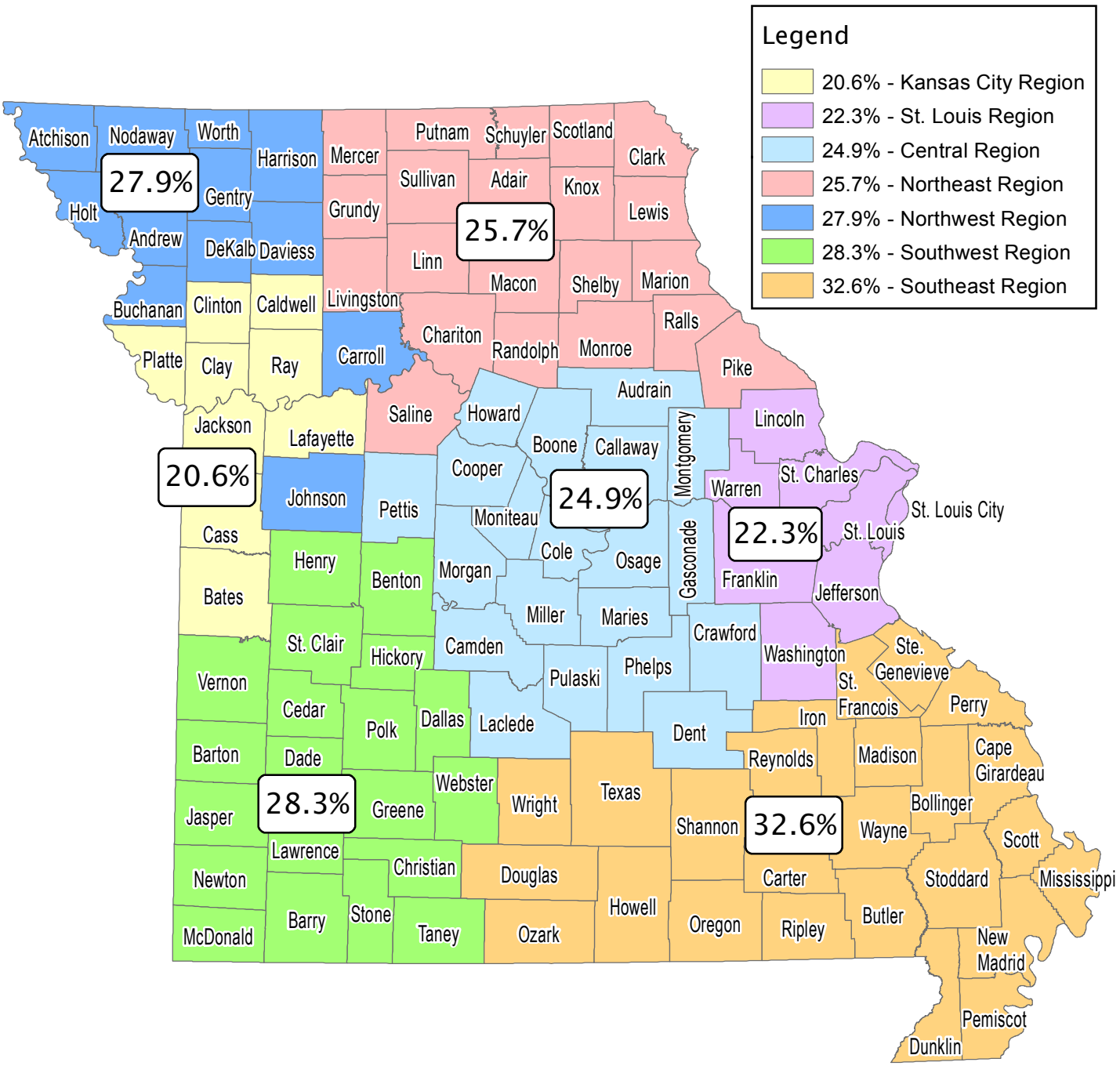
Appendix 5: Percent of Adults – Visited a Dentist in the Last Year by BRFSS Region Missouri 2012



Source: Missouri Behavioral Risk Factor Surveillance System, 2012
Missouri Department of Health and Senior Services

Office of Primary Care and Rural Health
S. Liley
M: Visited Dentist in last Year by Region 2012
June 2014

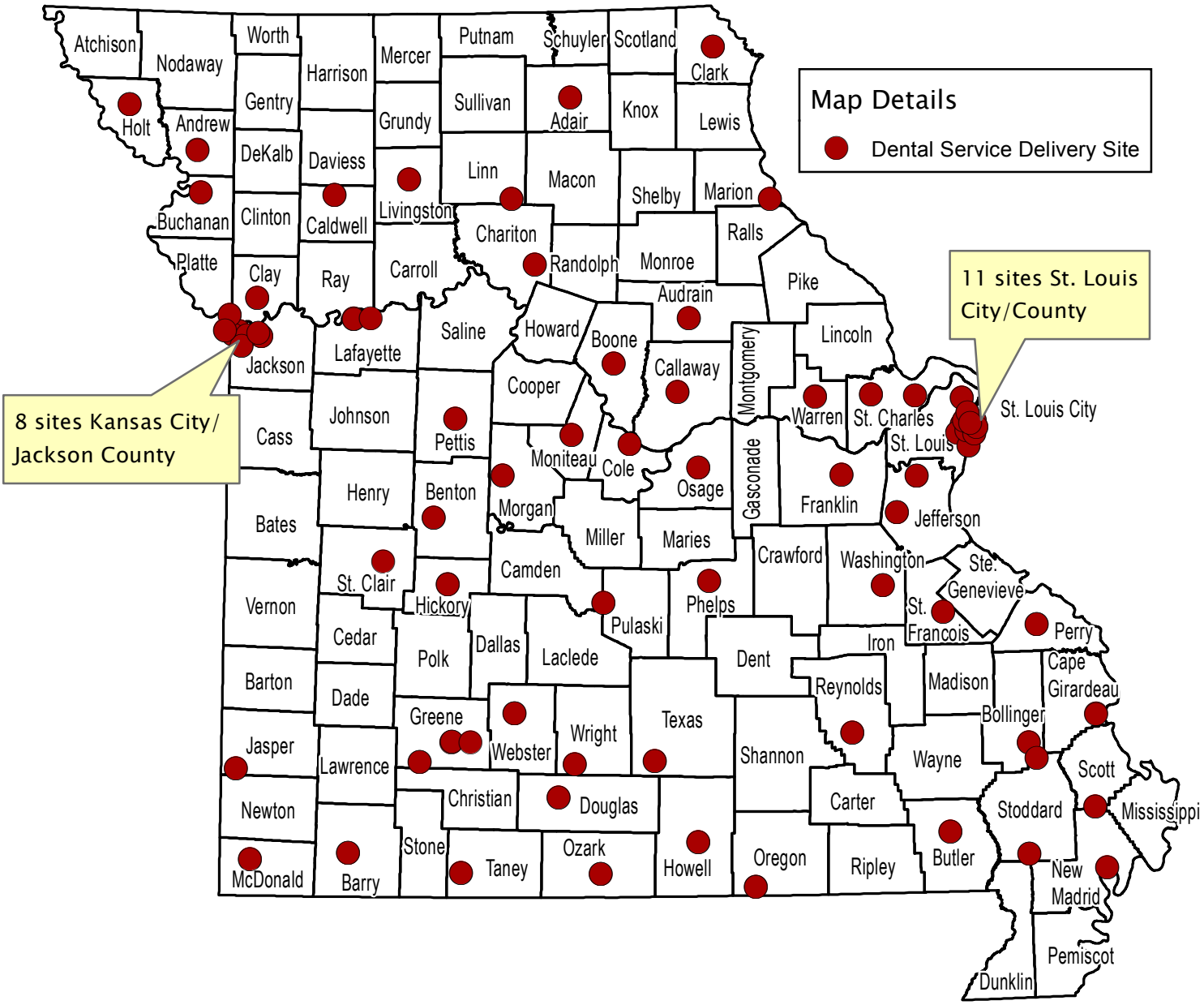
Appendix 6: Percentage of Adults 65 and Older – All Permanent Teeth Removed Due to Decay by BRFSS Region Missouri 2012



Source: Missouri Behavioral Risk Factor Surveillance System, 2012
Missouri Department of Health and Senior Services

Office of Primary Care and Rural Health
S. Liley
M: Permanent Teeth Removed by Region 2012
June 2014

Appendix 7: FQHC Dental Service Delivery Sites – July 2014



Source: Misouri Primary Care Association